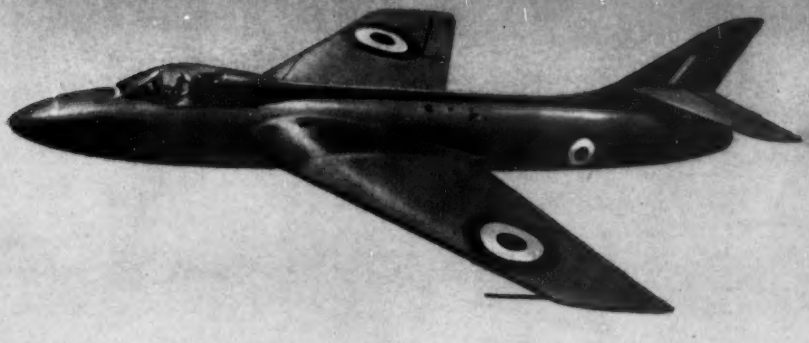
FLIGHT
AIRCRAFT ENGINEER
OFFICIAL ORGAN OF THE ROYAL AERO CLUB

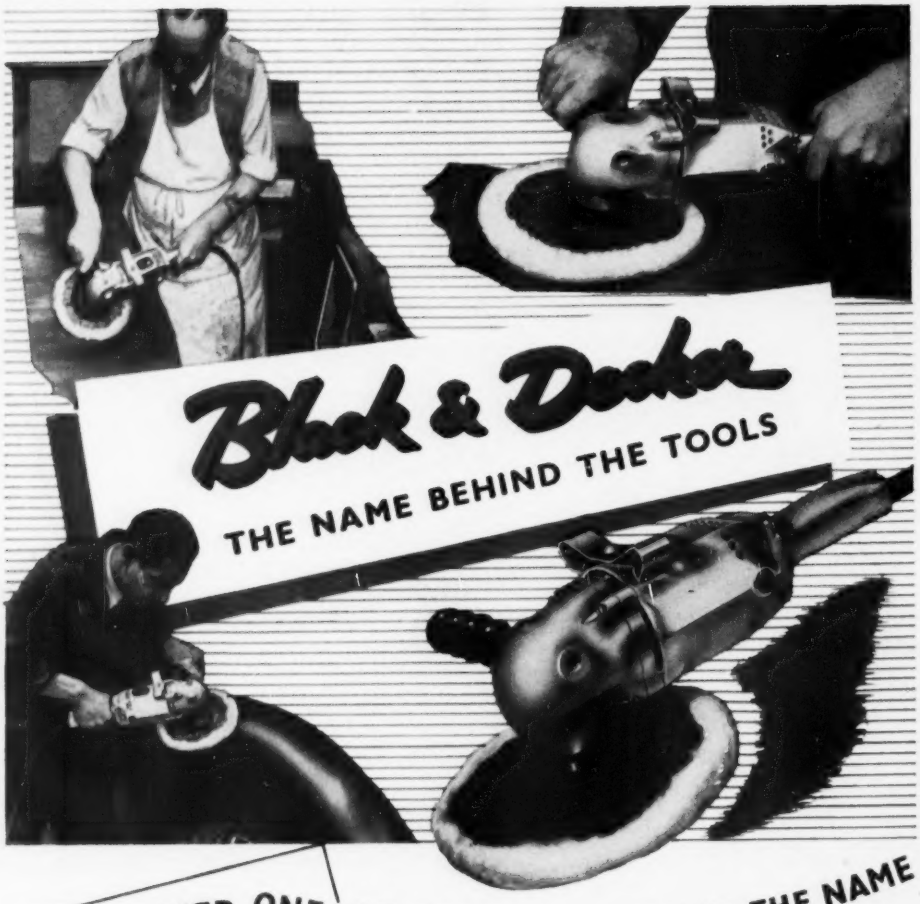


Hawker Hunter . . . *'Super Priority'*

When it was first seen, the Hawker Hunter was hailed as the finest fighter aircraft in the world. Now the production job for this superlative interceptor has been awarded 'super-priority' in the plan of Western defence.

HAWKER AIRCRAFT LTD., KINGSTON-ON THAMES, SURREY

MEMBER OF THE HAWKER SIDDELEY GROUP / PIONEER . . . AND WORLD LEADER IN AVIATION



7" VITRIFIER ONE OF THE TOOLS BEHIND THE NAME

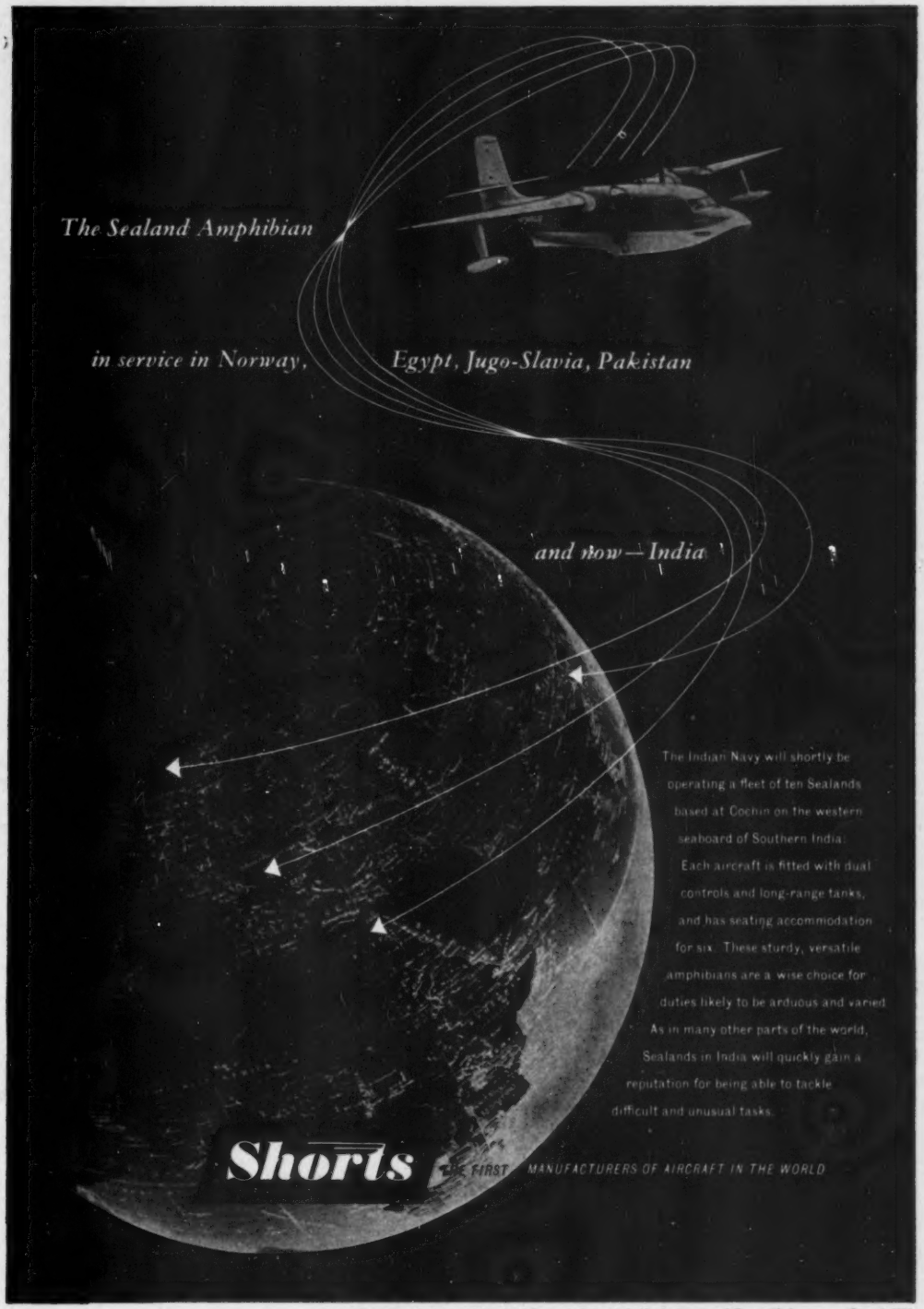
Supplied with flexible rubber pad and lambswool bonnet. Felt pads available for rubbing down cellulose, etc.

Leading Distributors everywhere sell Black & Decker
PORTABLE ELECTRIC GRINDERS
SANDERS · VITRIFIERS DRILLS ETC.
VALVE RECONDITIONING EQUIPMENT AND BENCH GRINDERS

Positively . . . the easiest, speediest way of polishing coachwork! Black & Decker 'Vitrifiers' do three jobs in one—remove road film, raise cellulose to a dazzling brilliance and protect the polished surface with a glaze. Wax and polish woodwork too, leather and leather-cloth etc. . . . If your electric polisher bears the name of *Black & Decker*, it belongs to the greatest, most versatile range of portable power tools in the world!

The first choice of craftsmen the world over

BLACK & DECKER LTD. HARMONDSWORTH, MIDDX. PHONE: WEST DRAYTON 2681/7
LONDON · BIRMINGHAM · BRISTOL · GLASGOW · LEEDS · MANCHESTER · NEWCASTLE · NOTTINGHAM
Swan's


The Sealand Amphibian
in service in Norway, Egypt, Jugo-Slavia, Pakistan
and now—India
The Indian Navy will shortly be operating a fleet of ten Sealands based at Cochin on the western seaboard of Southern India. Each aircraft is fitted with dual controls and long-range tanks, and has seating accommodation for six. These sturdy, versatile amphibians are a wise choice for duties likely to be arduous and varied. As in many other parts of the world, Sealands in India will quickly gain a reputation for being able to tackle difficult and unusual tasks.
Shorts
THE FIRST MANUFACTURERS OF AIRCRAFT IN THE WORLD

P27

Short Brothers & Harland Limited, Queen's Island, Belfast. London Office: 17 Grosvenor Street, W 1

A

...in the

part-time R.A.F.

On odd evenings and at week-ends you'll find gathered together the men and women of the Royal Auxiliary Air Force and the Royal Air Force Volunteer Reserve. They work in offices or factories during the day — and then in their spare time learn to master the new equipment and weapons of the R.A.F. They're friendly people doing particularly vital work. Why don't you join them? They need you.

Post the coupon now for full details of part-time service in your local unit.

TO: ROYAL AIR FORCE (F.R.75), VICTORY HOUSE, LONDON, W.C.2

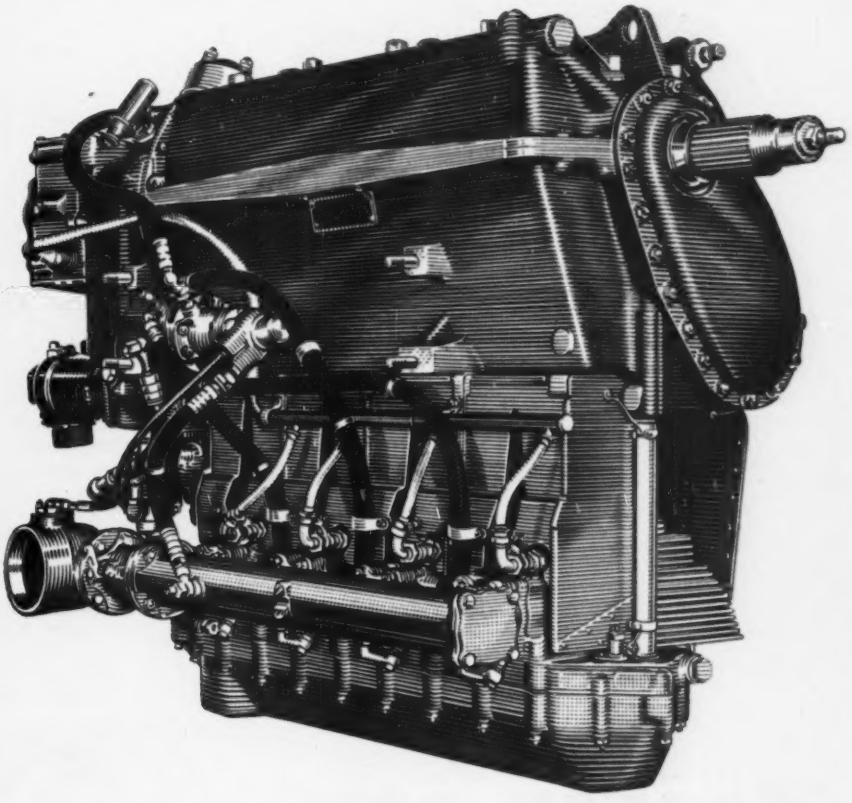
Please send particulars of part-time service in the R.A.F. (Applicants from British Isles only)

NAME .....

ADDRESS .....

(If ex-R.A.F. or ex-W.A.A.F. give rank, trade and No.)

★ IF YOU ARE BETWEEN 14 AND 17—AND KEEN—JOIN THE A.T.C. ★



THE

Cirrus

'BOMBARDIER'

is in production both for military and civil aircraft. The direct injection system of this 180 h.p. engine provides three outstanding advantages — Low Fuel Consumption — Rapid Throttle Response — Minimises Induction Icing.

BLACKBURN AND GENERAL AIRCRAFT LTD · BROUGH · EAST YORKS · ENGLAND

Best in its class. .

The original masking tape, "Scotch Boy" is still first in the field for all Masking, Holding, Sealing and Protection jobs. Thin, tough and flexible, it sticks at a touch, conforms readily to curves and can be easily and quickly removed.

Supplied in rolls 72 yards long and in a variety of widths.

★

"SCOTCH BOY" High Temperature Masking Tape

This tape is designed for straight line Masking on base metal surfaces which will be subjected to high Temperatures common to Baked on finishes. It can be used safely in temperatures up to 250° F. for one hour and in shorter heat cycles will withstand even higher Temperatures.

Excellent Tape for magnesium surfaces.

When ordering specify "Scotch Boy" Masking Tape No. 215.

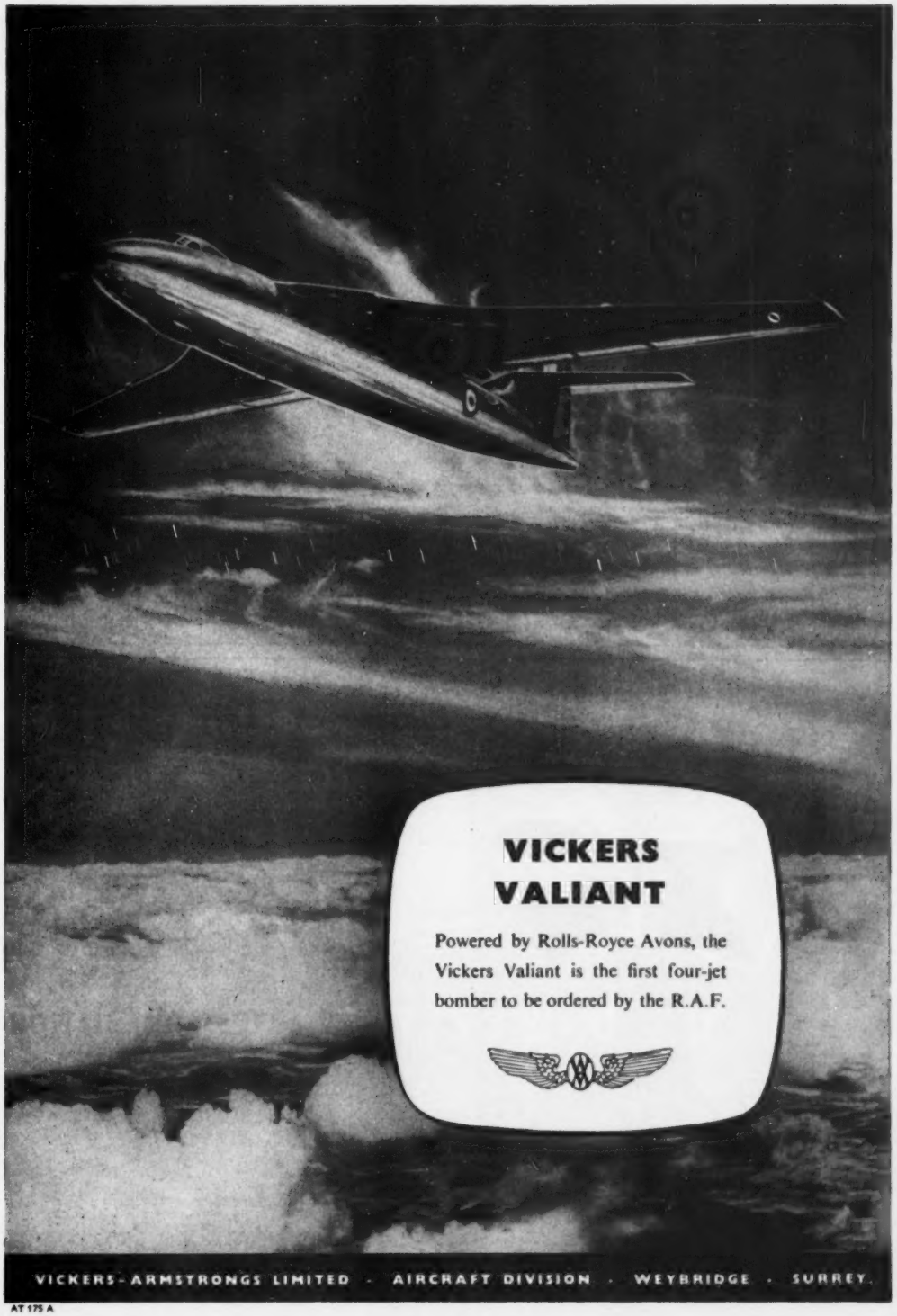
'SCOTCH BOY' *Masking* TAPE

ANOTHER 3M PRODUCT

Manufactured by

MINNESOTA MINING & MANUFACTURING COMPANY LIMITED

ARDEN ROAD · ADDERLEY PARK · BIRMINGHAM 8


VICKERS
VALIANT
Powered by Rolls-Royce Avons, the Vickers Valiant is the first four-jet bomber to be ordered by the R.A.F.
VICKERS-ARMSTRONGS LIMITED · AIRCRAFT DIVISION · WEYBRIDGE · SURREY.
AT 175 A

Teddington CONTROLS

★ WING AND ENGINE ANTICING SYSTEMS
★ STARTER TIME AND SEQUENCE SWITCHES
★ CABIN CONDITIONING SYSTEMS
★ MASS FLOW CONTROLS
★ WIND-SCREEN ANTICING CONTROLS
★ FUEL TANK PRESSURISATION
★ HOT AIR VALVES
★ FUEL VALVES
★ PRESSURE SWITCHES AND CONTROLS
★ THERMOSTATIC CONTROLS
★ HUMIDITY CONTROLS
★ ELECTRO-MAGNETIC VALVES

Each of these specialised requirements for modern aircraft opens up a spate of problems . . . each represents a field in which Teddington have acquired unique knowledge and experience.

Teddington

Teddington AUTOMATIC CONTROLS

TEDDINGTON CONTROLS LTD., CEFN COED, MERTHYR TYDFIL, SOUTH WALES. Merthyr Tydfil 666

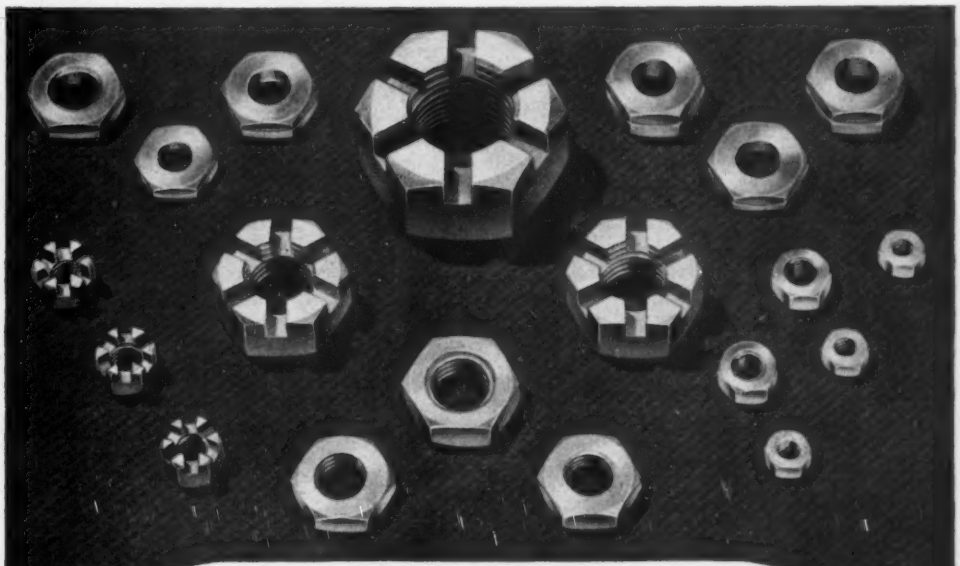
But for aircraft instrument dials . . .

Vinten

INSTRUMENTATION CAMERAS

W. VINTEN LIMITED · NORTH CIRCULAR ROAD · CRICKLEWOOD N.W.2 · TELEPHONE: GLADSTONE 6373

FOCUS ON **AIRCRAFT STANDARD NUTS**



Manufacture and maintenance of stocks of the biggest range of **AIRCRAFT STANDARD NUTS** in the country

. . . yet another of the ways in which we serve the Aircraft Industry.

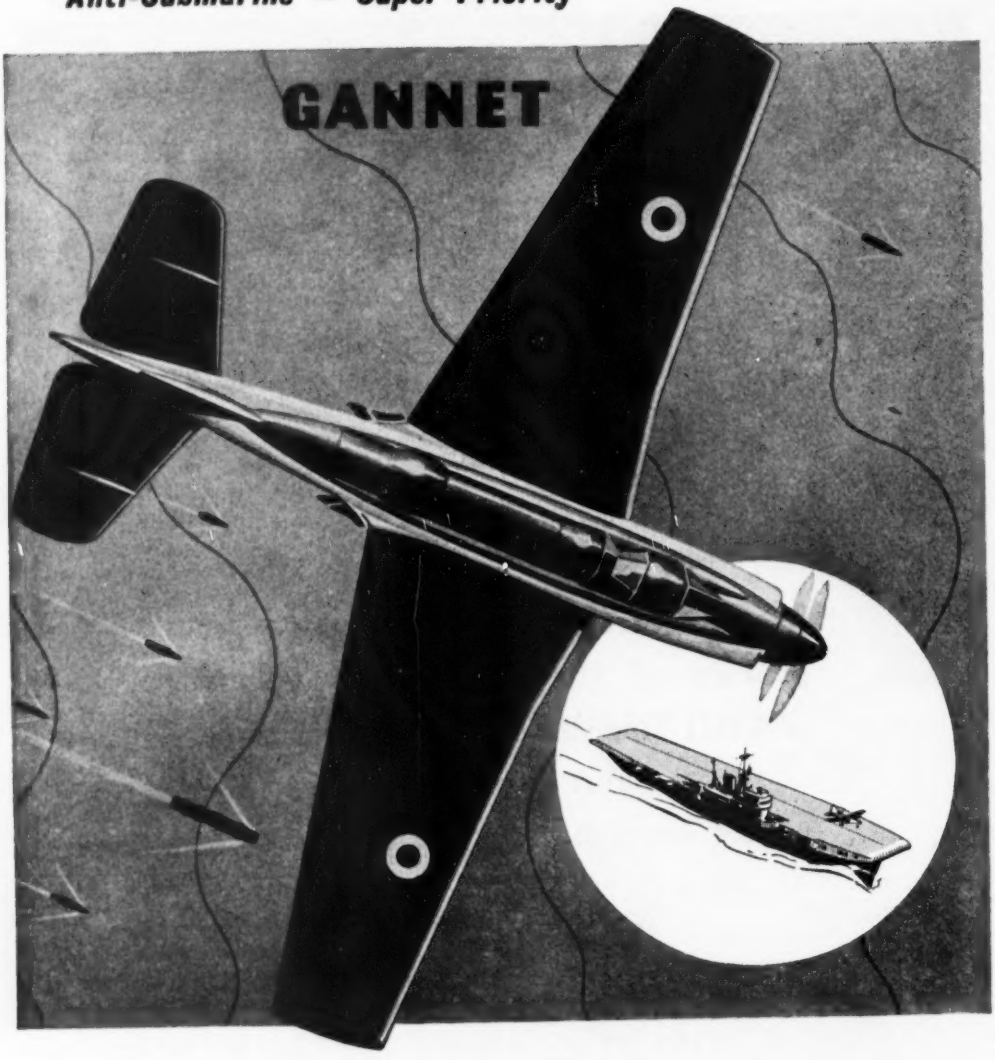
Brown Brothers (AIRCRAFT) Ltd.

The Largest Manufacturers and Stockists of **A.G.S., B.S.S. and S.B.A.C. STANDARD PARTS**

Telephones: **Northampton 4940** **London: Clissold 1280**

AIRCRAFT AND GENERAL ENGINEERS • HOUGHTON ROAD • NORTHAMPTON

Anti-Submarine — Super Priority



FAIREY

THE FAIREY AVIATION CO. LTD. : HAYES : MIDDLESEX

FLIGHT
and
AIRCRAFT ENGINEER

First Aeronautical Weekly in the World

Founded 1909

No. 2278 Vol. LXII. FRIDAY, 19 SEPTEMBER 1952

EDITOR
MAURICE A. SMITH, D.F.C.

ASSISTANT EDITOR
H. F. KING, M.B.E.

ART EDITOR
JOHN YOXALL

Editorial, Advertising and Publishing Offices:
DORSET HOUSE,
STAMFORD STREET,
LONDON, S.E.1.

Telegrams, Flightpres, Sedist, London.
Telephone, Waterloo 3333 (60 lines).

Branch Offices:
COVENTRY
8-10, Corporation Street.
Telegrams, Autocar, Coventry.
Telephone, Coventry 5210.

BIRMINGHAM, 2.
King Edward House,
New Street.
Telegrams, Autopress, Birmingham.
Telephone, Midland 7191 (7 lines).

MANCHESTER, 3
260, Deansgate.
Telegrams, Iliffe, Manchester.
Telephone, Blackfriars 4412 (3 lines).
Deansgate 3595 (2 lines).

GLASGOW, C.2.
26b, Renfield Street.
Telegrams, Iliffe, Glasgow.
Telephone, Central 1265 (2 lines).

SUBSCRIPTION RATES
Home and Overseas: Twelve months, £3 3s. 0d. U.S.A. and Canada, $10.00.
BY AIR: To Canada and U.S.A., six months, $16.

IN THIS ISSUE:

At the Controls of the Universal - - - - - 374
Two-Row Leonides - - - 381
A Layman at Farnborough - - - 383
Our American Correspondent Reports 384
The 698 - - - - - - - 385
Fokker's New Factory - 388
Static Show in Retrospect - - - - 391

The Time to Clinch

TO sell aircraft abroad is a most (if not *the* most) important single objective of the aircraft industry—both in its own interest and in that of the nation. If it can succeed in doing so, then many other important requirements will automatically be satisfied. Most of these have been referred to in our leading articles during the year, and frequently, of late, in public speeches. First, a stable industry is essential if the right men—technicians and skilled workers—are to enter and stay in it and give of their best. Next, good-sized production orders are needed if prices and deliveries are to be competitive, and such orders, either military or civil, cannot always be placed by British users. These two *desiderata* can together ensure that a healthy industry with sufficient productive capacity is there to draw upon in emergency—a third main requirement. A sufficiency of skilled men, the best aircraft at the right price, and a strong industry, are the essential background for an export drive; and so the circle is completed.

A year or two ago there were few people who really believed that production of civil airliners for home and export could be achieved concurrently with a great rearmament drive. Even fewer thought that America would seriously consider buying British jet and other aircraft; some even doubted that the Comet I would go into regular passenger service with B.O.A.C. But these things have been achieved, and slowly but surely the full weight of the Government is being placed behind the aircraft manufacturers in their drive for sales abroad, for a scale of production that will permit acceptable delivery dates and for the proper expansion of our own merchant air service.

Neither the growing confidence that peace will be preserved nor the desperate need to earn foreign currency has wholly accounted for this new attitude. We believe that there has been a change of heart and a belated realization of what aviation can offer. The parallel of the growth of shipping in the first Elizabethan era and the signs of another great transport industry building up in the reign of Queen Elizabeth II makes an irresistible appeal.

The progress made during the last year or so—outstripping in most respects that of all other nations—has been quite remarkable. Pardonable impatience makes the steps from design of prototype to production line seem unbearably slow, but at last we have some really first-class civil aircraft in production, with others following hard behind; and at the same time our fighting Services are beginning to receive aircraft which can be confidently matched against all comers.

Historians may come to look back upon the period from 1949 to 1954—the early jet, delta and sonic years—as one of resurgence when the great companies of the British aircraft industry managed to throw off the lethargy and dispense with the artificiality which followed an exhausting war.

But only determination and effort in the coming months will enable the country and the aircraft industry to profit from its recent outstanding achievements.

And so in the coming months new-series Comets, Viscounts, Britannias, and other designs must be speeded along the production lines so that more American, Commonwealth and foreign orders can be booked. To maintain our lead, later marks and new types must also follow close behind—transport versions of the Vickers Valiant and Avro 698, and turbine-powered flying-boats as well perhaps. That new markets are opening up for British feeder liners in the Commonwealth and even America has been confirmed by more than one authority. The manufacturers, we are sure, are ready to go to any reasonable limit to design, build and sell. If that is not quite enough, then it is to be hoped that the Government will reinforce their words with added deeds and find means of providing the extra help required. This may be financial, the allocation of priority for materials, or simply in the form of a guarantee to a manufacturer who seeks further to expand production arrangements without waiting for firm orders. Whatever happens we must avoid this threatened deadlock of orders waiting upon production and production upon firm orders. Opportunity can slip through the fingers like sand—the sands of time.

At the Controls of the UNIVERSAL

—on the Return Flight from Farnborough to Brough

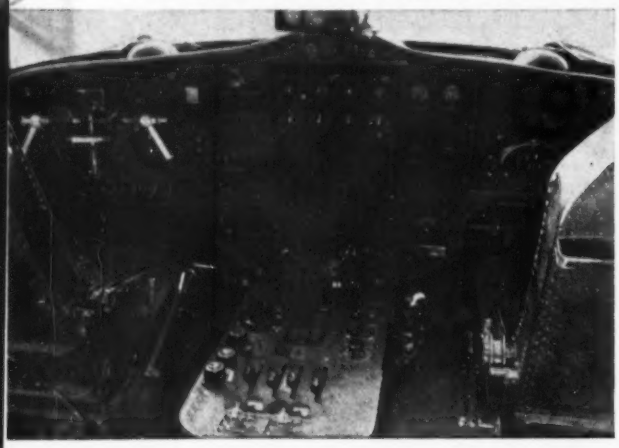
By THE EDITOR

The pilot of another aircraft might have had this view of the Mk 1 Freighter on the flight north to its base at Brough, Yorkshire.

ONE of the most welcome pieces of news heard at Farnborough time was the announcement of a military order of undisclosed size for the Blackburn Universal Freighter. The number involved has still not been revealed, but the latest (quite unofficial) rumours place it at over twenty. The degree of priority is important, both from the point of view of speed of production and the possibility of slipping a few civil machines in with the military batch. Inevitably, all customers will have to wait for rather more than two years, but, depending upon the availability of the first Mk 2 prototype, due to fly before the middle of next year, a civil C. of A. may be obtained in good time.

To some extent plans for production have beaten the gun, for the manufacturers, like many other people, felt that, however much delayed, an order must eventually be forthcoming. Thus most of the main units have been "productionized" (may I be forgiven for using the term?) and the new centre-section, incorporating the four Centaurus engines, is now being tackled. A lot of work will have to be done on the equipment, for in the interests of economy the Mk 1 was divested of all non-essentials and a number of such items —de-icing, interior heating—will now have to be introduced.

In spite of its size, the Mk 1 completed its preliminary handling trials at Boscombe in three weeks—probably a record. The heavy-drop trials with doors off were also completed satisfactorily on the first attempt. Floor angles were as required—normally with load the angle is 3 deg—and no untoward trim change was felt by the pilots. Visitors to Farnborough will have noted the type of roller conveyor used on the Freighter floor. Lighter designs may be available later with spaced reels replacing the long rollers.



Little time is required to memorize the instrument and control layout of the Universal. The pilots are confronted with blind-flying panels and the engine dials are located centrally.

Unofficially, during the trial flights, there has been some competition to take the first running jump out of the back, but no one has yet been permitted to do so. With doors off, the prototype is some 5 m.p.h. slower, and the Mk 2, with the new doors and tail boom, will also be a little slower when doorless. Control is unchanged.

The bogies and legs are, of course, immense, and some thought has been given to retraction and to the possibility of spats or trousers. Retraction is worth while for ranges of over 1,200 miles, but this is well beyond the normal range with load. Possible folding schemes might be to invert and tuck the whole gear into the inboard nacelles or simply to tuck the bogies inwards into their stub-wing side supports. Nevertheless, these thoughts are mainly academic. Efficient streamlining of the bogies and knuckles of the Mk 2—a tricky job—might add as much as 14 m.p.h.; the knuckles alone are worth fairing, and this would be relatively easy.

The bodies have proved to be very satisfactory, but the braking would profit from Maxaret. It seems that the rear outer tyres are likely to take a beating if full-power braking is used on tarmac or concrete. Perhaps next year at Farnborough we may see this leviathan rival the performance of the Pioneer with the aid of 12,000 Centaurus horses and either Jato or Sprites for take-off, and with its braking airscrews and bogie brakes in full use on landing. It is said that the side supports for the landing-gear legs, which are of aerofoil section, give sufficient lift to support the wheels.

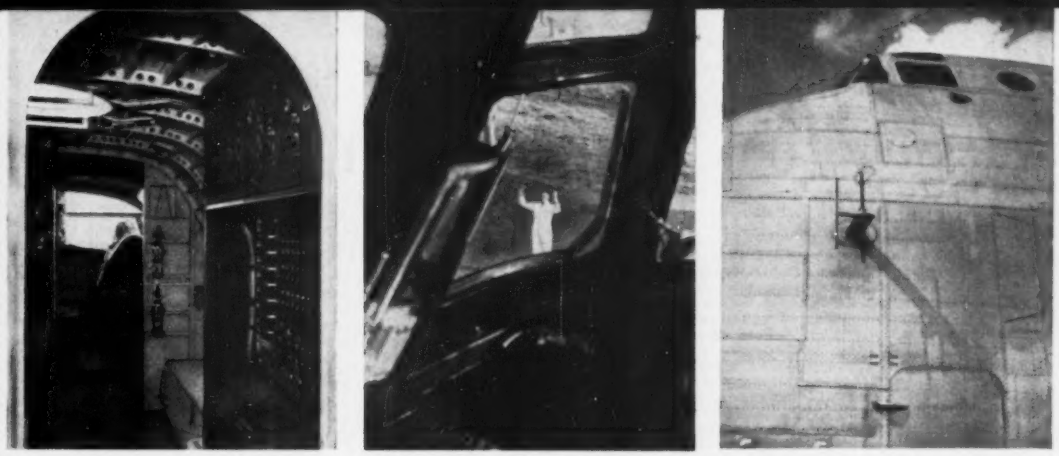
When it was time to take off on our flight north, the four Centaurus engines all started up on the first push of the buttons, and after a brief warming-up period Tim Wood turned the great machine round and back-tracked up the Farnborough runway. The simple take-off check was completed while this went on and take-off flap was selected. At the runway end we swung round and went straight off.

The flap position is fully variable, but a gate is provided for the maximum-lift position. Turning and manœuvring on the ground call for a good deal of differential use of engines, but no doubt the nosewheel steering on the Mk 2 machines will simplify this.

For take-off the pilot did very little other than line-up the aircraft and open the throttles. Differential braking is provided by the rudder pedals. The noise up front was loud, and the machine accelerated quite fast in its light condition. At just under 100 m.p.h. a pull on the controls lifted the Universal off and she quickly gathered climbing speed.

For the early part of the flight I wandered about the machine examining the spacious crew-compartment, peering along the wing interior walkway and then standing (without a stomach, it seemed) at the open back end of the hold, looking out below or up into the boom compartment—which is not accessible in flight with the doors off.

After we had passed Cranfield I returned to the cockpit



These unusual views, indicative of size, are (left to right) of the co-pilot from the crew cabin, of the batsman from the captain's seat, and, reversing positions, of the captain (H. "Timber" Wood) as he might be seen by the ground crew.

and took over the controls in the second-pilot's seat. The seat itself is adjustable fore and aft and up and down and, as might be expected, the view is excellent. The clear-vision window arrangements are to be improved on the next machine.

With the seat in the position most comfortable for me, the coaming and the oblique angle of observation made the blind-flying instruments difficult to see. The screen-wiper was effective and useful—until the operating fluid happened to leak out, and then several rainstorms through which we flew blurred one's vision, except through the angled side and top panels.

All the flying controls are power-operated—by Fairey Hydro Boosters—and so the pilot is not called upon to exert himself. This does not mean, however, that an aircraft with so large a span does not take some time to develop or lose bank when aileron is applied. In fact, the ailerons are of comfortable weight and pleasant to use, with the possible exception of the neutral point, when one gets an impression similar to that given by car steering that has developed play. The elevators seem lighter and more effective than the ailerons, and a very small movement produces a comparatively large result. The rudders are somewhat heavier, and for an accurate turn need to be used more than on most large aircraft.

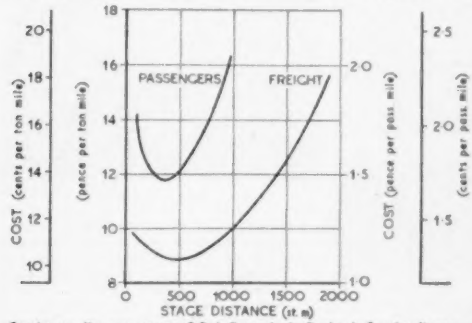
Tim Wood told me—and I soon found out the value of his advice—that there is no useful purpose in "chasing" a large aircraft when in rough air it swings its nose or wallows a little. If left alone it smooths out again. There was even a slight similarity to helicopter controls in this quality, for the tendency is to over-correct, and one flies best after learning to leave the aircraft substantially to itself.

Over Lincolnshire, the Universal rumbled sturdily on at a steady 160 m.p.h. with 2,400 r.p.m. and +2½ lb boost. I tried one complete 360-degree turn over Spitalgate and found that the minimum of elevator holds the nose up and that a Rate 2 turn does not seem too steep.

According to the pilots who have done most flying in the Universal, she feels best with a load on. Elastic dihedral of about half a degree gives a difference of 2ft or more at the wing-tips, and this can be detected quite easily in flight—as it could be, for instance, on Lancs. and Lincolns. Viewed from the ground, the aircraft sits in the air differently. The Mk. II Freighters will be built with three degrees more dihedral on their outer wing-sections.

At the south bank of the Humber, Tim Wood took over for the approach—in a stiff cross-wind—over the Blackburn works. He treated the Universal much as one would an Anson, making a wide approach at about 110 m.p.h. I could not tell when the round-out began, nor could I detect any change between approach and touch-down attitude. The pilot had his left hand on the throttles and his right on the "handlebars." We touched one wheel first—this operated the micro-switch controlling the pitch-reversal for the braking airscrews—and into reverse went the power levers under the pilot's waiting hand. The fact that the Freighter had bounced and was at perhaps 4ft again made no difference, but the next touch-down was positive and the speed of pull-up exceptional. This was certainly the first time the machine has been airborne in reverse pitch!

My overall impression was that pilots and crews will take kindly to the Freighter, and particularly to the improved Mk II. If noise can be reduced by soundproofing the crew compartments and perhaps by suitable collection and deflection of the inboard exhaust, it will be a good thing. The radio operator's station is especially noisy in its position between the engines. For short-range civil use the large crew compartment might be used for passengers; there would be plenty of room for a crew of three (or two) in the cockpit. Using its huge capacity to the full, the load-moving potential of the Universal over stages of up to 500 miles is unique.



Cost/stage distance curves, S.B.A.C. method. Payloads for the distances indicated, 0 to 2,000 miles, are respectively 21.9, 19.8, 15.85, 12.1 and 8.35 short tons.

Mr. J. Hall, Blackburn and General's development engineer, describes the Universal to the C.A.S. Others (left to right) are Mr. R. H. Stone, secretary; A.V-M. H. N. Thornton, sales director; and Mr. E. Turner, managing director.

FROM ALL QUARTERS

Hurricane to Hunter

NEARLY 200 jet fighters and bombers—the largest number of jet aircraft ever seen over London—took part in Monday's Battle of Britain Fly-past. The weather, though heavily overcast, was better than on many previous occasions; the lone Hurricane, traditionally flown by an anonymous Battle-of-Britain pilot at the head of the formation, made its appearance at the scheduled time of 12.30 p.m. A flare on the Air Ministry roof guided formations towards the "Zero Line" at Whitehall.

Next overhead, flying in excellent formation at 1,500ft, were 96 Meteors in four groups of 24; as they passed by, they overtook flights of Bomber Command Lincolns 1,000ft above them. The "heavies" were obviously finding the 2,000ft cloud ceiling troublesome, and two of the flights of three Lincolns broke formation over Whitehall on encountering a hanging wall of dark cloud.

Twenty-two Sabres, representing the R.C.A.F., headed the second stream of jet formations, which passed beneath the rearguard of the 25 piston-engined machines—12 Washingtons in four flights of three. The Sabres were two aircraft short, but the Navy had evidently been quick to fill the breach, for the next group consisted of eight instead of six Attackers. Behind them flew 24 U.S.A.F. Sabres, followed by four flights of three Canberras. American F-86s were to have taken part in last year's fly-past, but it was cancelled; these swept-wing fighters were thus making their first "official" appearance over London. The Canberras and Attackers were also taking part for the first time.

The entire parade passed in less than eight minutes—a tribute to the thorough planning and practice which preceded it. So far as could be judged, all the formations flew at the fixed speeds laid down to ensure a concentration of aircraft at the right time and place: 184 m.p.h. was specified for the Hurricane; 167 m.p.h. and 196 m.p.h. respectively, for Lincolns and Washingtons; and 346 m.p.h. for jet fighters—except the Hunter. The new Hawker prototype, flown by Neville Duke, was permitted to conclude the fly-past "at its own speed"—which it did in a fashion that caused amazed comment in the streets. The Valiant, which was to have taken part, was withdrawn from the fly-past because of urgent development work.

Pilots were briefed to make their outward and return journeys to base over a large number of populated areas so that, although London was the focal point for the formations, participating aircraft were seen in many other parts of England.

R.A.F. "At Home" Day

TOMORROW (Saturday) is R.A.F. "At Home" Day, during which 76 R.A.F. stations will be open to the public and will provide flying displays, ground demonstrations and static exhibitions.

The static aircraft display in the Horse Guards Parade, London, continues until Sunday next, and the Lancaster on view at Battersea Park remains until September 28th. In addition, there is an R.A.F. display of static aircraft in the public enclosure at London Airport today, Friday, and the photographic exhibition in the Assembly Hall, Air Ministry, Kingsway is open today and tomorrow until 6 p.m. The central feature in this latter exhibition is a reproduction by colour transparencies of the Battle of Britain Memorial Window in Westminster Abbey.

On Sunday, the principal event will be the thanksgiving service in Westminster Abbey at 3 p.m., at which the address will be given by the Dean of Westminster. Before the service, wreaths will be laid on the R.A.F. Memorial on Victoria Embankment, and a parade, consisting of contingents of the R.A.F., W.R.A.F., Princess Mary's R.A.F. Nursing Service, R.O.C., R.A., R.E., W.R.A.C. and R.A.F.A. will march from Wellington Barracks to the Abbey.

Ben Gunn's Gallant Try

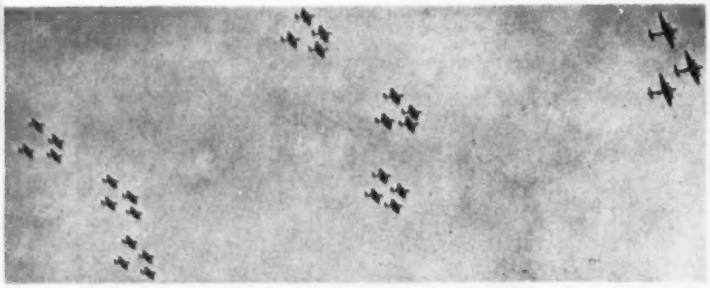
FURTHER details of the loss of the P.120 delta on August 29th have been given by an executive of Boulton Paul Aircraft, Ltd., who paid a high tribute to the courage of the pilot, A. E. Gunn.

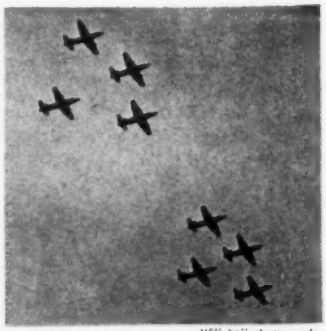
A. E. ("Ben") Gunn

Gunn had taken off from Boscombe Down to carry out eve-of-show flight trials, during which—said the official—"something went wrong," and the pilot had the greatest difficulty in keeping the machine in level flight. The moment he throttled back to decrease speed, the aircraft tended to turn over on its back. Instead of baling out, Gunn made an attempt to save the aircraft, in the hope that later analysis might reveal the cause of the trouble. He took it up to more than 12,000ft and, still in difficulty with the controls, described the symptoms over the R/T to technical staff on the ground.

For over 13 minutes Gunn and the engineers exchanged information; meanwhile the aircraft was gradually losing height. At less than 2,000ft, Gunn finally decided not to attempt to land the aircraft and, using his ejector seat, he baled out. He landed in a tree near Grateley, Andover, more or less unhurt, except for a damaged left hand and a bruised forehead.

Gunn's courageous action in staying with his aircraft and attempting to provide valuable research data while completely ignoring his personal danger was highly praised by the makers.



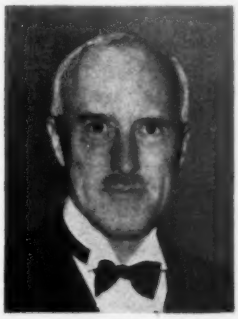


"Flight" photographs

HEADING FOR WHITEHALL: Battle-of-Britain formations viewed from the roof of "Flight's" offices: on the left are three B-29 Washingtons and a faster formation of 22 F-86 Sabres; (top left) 24 Meteors about to overtake a flight of three Lincolns; the Navy was represented (right) by eight Attackers, making their first appearance in the fly-past.

Air Marshal Sir Richard Peck

WE deeply regret to record the death of Air Marshal Sir Richard H. Peck, K.C.B., O.B.E., who succumbed to a heart attack last Friday while on holiday at Montreux, Switzerland. During most of the last war he was the anonymous "Air Ministry spokesman" who gave information on R.A.F. affairs to members of the Press.



Sir Richard Peck.

His willingness at all times to assist and advise aviation journalists, and his tact, largely helped to make possible the excellent relations which existed between the Press and the Ministry. After the war he became a Governor of the B.B.C. and vice-chairman of the National Savings Committee, concerned particularly with the encouragement of saving among members of the Services. His success in this latter appointment is clear from the announcement last week by Lord Mackintosh that savings from the Services had more than doubled in the past five years.

Richard Hallam Peck was born at West Derby on March 2nd, 1893, and was the younger son of Mr. Richard Edwards Peck, of Liverpool. He was educated at St. Paul's School and at Brasenose College, Oxford, and was commissioned in the 11th Battalion, The East Surrey Regiment, in December 1914. He was seconded to the R.F.C. in January 1916 and, for distinguished service in France and at home, he was appointed O.B.E. in 1919. He then resigned from the Army and was granted a permanent R.F.C. commission as squadron leader. After postings to the School of Wireless Telephony and to No. 1 Flying Training School, he commanded No. 84 Squadron in Iraq, where he was mentioned in despatches for service in Kurdistan.

After attending the Army Staff College course at Camberley, he became a wing commander in July 1927, and for the next three years was in the Directorate of Operations and Intelligence, Air Ministry. He then joined Coastal Area Headquarters, remaining attached to the Air Ministry for special duty, and in 1932 he was promoted to group captain and appointed to command No. 3 Flying Training School at Grantham. He was selected for the 1933 course at the Imperial Defence College, following which he was for two years Deputy Director of Operations and Intelligence. Promotion to air commodore came in January 1936, with an appointment to H.Q. India, where he served for over three years as S.A.S.O. and, for a time, as acting A.O.C.

He became an air vice-marshal in January 1939, and then returned to the Air Ministry, firstly as Director of Operations and then, following the outbreak of war, as Director-General of Operations. He was appointed an Assistant Chief of the Air Staff in February 1940, a C.B. in 1941 and a K.C.B. in 1943. In July 1941 he was granted the acting rank of air marshal, and was permitted to retain this rank on his retirement in 1946.

Following his retirement came his B.B.C. and National Savings activities, and election as president of the R.A.F.A. in 1949. He had married in 1931 Lilian Fay, younger daughter of Mr. W. J. Young; there were no children of the marriage.

The Farnborough Accident

AS we briefly recorded last week, the verdict returned by the Coroner's jury which inquired into the deaths of John Derry and Tony Richards in the D.H. 110 accident at the Farnborough Display was that both had "died accidentally in the normal course of their duty." At the time of the inquest (September 8th) 19 of the spectators who lost their lives had been identified, and in this case the jury's verdict was that "the deaths were accidental"; they added the rider, "no blame is attached to Mr. John Derry." The Coroner said that his official verdict would be that "these persons died from multiple injuries when accidentally struck by portions of a falling aircraft."

Previously, G.C. S. W. R. Hughes, who was controlling the Display flying, had given his account of the events leading up to the crash. Evidence as to the airworthiness of the D.H. 110, which had done a total of 125 hours before it took off for the Display, was given by R. C. Grinter, supervising chief inspector with the de Havilland Company.

Among official statements that have since been made, one by the S.B.A.C. especially deserves to be placed on record. After thanking the British Red Cross, St. John Ambulance Brigade, local hospitals and other organizations and persons who rendered valuable and prompt assistance, the Society refers to the fact that the first-aid parties were "helped beyond measure by the steadiness, calmness and quiet refusal to panic of the crowd of some 120,000." It adds: "No tribute could be too high for the man-in-the-street and his wife and family who came to Farnborough that afternoon to watch the great demonstration of British aviation and would not be deterred from staying to the end."

At Farnborough last Sunday some 1,500 people—including Mr. Lennox-Boyd (Minister of Transport and Civil Aviation) and senior officers and officials of the R.A.F., the R.A.E., the S.B.A.C. and other organizations—attended a Memorial Service to Derry, Richards and the 30 members of the public who lost their lives (the death-roll had increased from 29 during the week). The gathering took place in the marquee which had housed the Static Exhibition. The Rev. H. F. Poole officiated and the Bishop of Guildford pronounced the blessing.

A formal Memorial Service for Derry and Richards was held at St. Albans Abbey on Monday last. The Bishop of St. Albans officiated, and the relatives of the two men attended, together with senior officers of the Royal Air Force, de Havilland executives, and S.B.A.C. and other officials.

Last week-end the *London Gazette* announced that Her Majesty the Queen had ordered the publication of the names of Derry and Richards as having posthumously received the Queen's Commendation for Valuable Service in the Air.

Cumberbatch Trophy Presented to T.E.A.L.

AT a brief informal ceremony at Londonderry House on September 11th the Cumberbatch Trophy was presented to Tasman Empire Airways, Ltd., by the Master of the Guild of Air Pilots and Air Navigators of the British Empire, Mr. J. Lankester Parker. The recipients were represented by their general manager, A. Cdre. Roberts, and their chief engineer, Mr. George Bolt.

Normally, the presentation is made at the annual Court installation ceremony, which this year is due to take place on October 9th at the Innholders Hall. As Tasman's headquarters are some 12,000 miles away, the method of presentation posed something of a problem until it was learned that two senior representatives were visiting this country for the S.B.A.C. Show and to attend the I.A.T.A. conference in Geneva. A special ceremony was arranged without delay, and it was indicative of the high regard felt for Tasman and the importance attached to this presentation for safe flying that many distinguished guests attended at short notice. In particular, the presence of the New Zealand High Commissioner in London, the Hon. F. W. Doidge, and his official secretary, Maj.-Gen. W. G. Stevens, C.B., C.B.E., was very gratifying.

In a brief speech before the presentation Mr. Lankester Parker said: "Despite considerable natural difficulties, greatly enhanced by the impact of war, Tasman Airways operated passenger, mail and freight services between New Zealand and Australia from 1940 onwards. For the first six years they managed to operate that treacherous route of more than 1,300 miles across the Tasman Sea with incredible regularity—with only two aircraft. They were Short Empire boats with Bristol engines, and were working very near to the limit of their practical range, and with a minimum of navigational aids as we know them today. And so the essential war-time communications between New Zealand and Australia were maintained. After the war, converted Sunderland flying

Proud winners of the Cumberbatch Trophy this year are Tasman Empire Airways, Ltd. On the right is A. Cdre. G. N. Roberts, C.B.E., A.F.C., general manager, and, left, Mr. G. B. Bolt, F.R.Ae.S., chief engineer.

FROM ALL QUARTERS . . .

boats with much improved navigational equipment and with a little more range in hand were brought into use. Since 1949 the service has continued with the larger and faster Solent flying boats with more powerful Bristol engines."

Admiral Slattery, of Short Bros., and Mr. Macaulay, of the Bristol Aeroplane Company, were welcomed at the presentation.

The Master then quoted some relevant statistics. During the 11 years under review, he said, Tasman had flown 7½ million service miles, carried 130,000 passengers, and maintained a regularity of service of 99 per cent. A. Cdre. Roberts had informed him that Tasman themselves attributed much of their success to the efficiency of their captains and first officers, and on the insistence that both should possess first-class navigators' licences. They had largely trusted the reputation of their company to their captains' own keeping. "We of the Guild accept this tribute with pride," said the Master, "but we know also how much A. Cdre. Roberts and Mr. Bolt contributed personally."

The Cumberbatch Trophy was first awarded by the Guild in 1938-39 to Wrightways, Ltd. The next recipient, after the war, was A. Cdre. H. G. Brackley (1947-48), while in 1948-49 Aer Lingus received the distinction. Last year the Trophy was awarded to No. 3 Line, B.O.A.C., for their magnificent record on the Atlantic route. Guests were reminded that the effective paragraph of the condition of award was: "Air safety is the main basis of the trophy. It will be awarded to organizations whose actions over a period have contributed towards complete freedom from accidents; or it may be awarded to any person or bodies incorporate who, in the opinion of the Court, have contributed towards air safety. . . "

In conclusion, Mr. Lankester Parker said: "Safety in the air for the ordinary traveller has not been easily won, and, quoting from the charge in the Guild's Ceremony of Installation, 'Aviation has found many gallant sons willing to give themselves for the benefit of future generations.' Added poignancy is given to the thought by last Saturday's dreadful accident involving John Derry and others. It is from the hazards accepted by them that the foundations have been laid upon which security in the air has been achieved."

Receiving the Trophy, A. Cdre. Roberts said that he did so with pride and sense of deep privilege; in doing so he remembered employees, past and present. The palm should go to the engineering and operations divisions, who had made the biggest contribution towards winning the coveted Trophy. He also remembered the airworthiness authorities of the United Kingdom, Australia and New Zealand, and the manufacturers of the aircraft and engines. In aviation, New Zealand's loyalty—and particularly that of T.E.A.L.—to Britain, had resulted in the keeping open of a market which he trusted would grow. Tasman now found themselves with the choice of Comet and Britannia, both leaders in the world of aviation. It had been stimulating to be in Britain during Farnborough week, and he thought it significant that on this occasion the new aircraft were about 95 per cent turbine-powered. "We supporters of British enterprise can but hope that, despite the old country being besieged by rearmament and other grievous problems, the Government will be able to overcome the production problem, even if it means compromising with the motor and shipping industries. If this problem can be met, Britain may well control the air transportation industry for decades," said A. Cdre. Roberts. He concluded by observing that the presentation of the Cumberbatch Trophy would be deeply appreciated by the people of New Zealand as a whole.

SPACE-FLIGHT CONFERENCE

Delegates from a Dozen Countries Attend Third Astronautics Congress

TWO years ago, in September 1950, the First Congress on Astronautics was held in Paris. The object of this initial meeting was to discuss the possibility of founding an International Astronautical Federation, and it was attended by representatives of eight national societies. Complete agreement was reached as to the desirability of such a step and a provisional bureau was formed, consisting of the heads of the delegations, with Dr. Eugen Sänger as their chief. Dr. Sänger is well-known for his pioneer work on rockets and extreme-altitude high-speed flight.

During the following 12 months the opinions of the various societies were collected and a proposed draft constitution drawn up by the British Interplanetary Society. This was, in the main, agreed to during the Second Congress, held in London in September 1951; but, as there were still points of disagreement—mainly concerning voting procedure—the signing of a final constitution was held over until the following congress. The secretariat of the Federation was established in Baden, Switzerland, and Dr. E. Sänger was elected president.

The Third Congress, held in Stuttgart a fortnight ago—from September 1st to 6th—was sponsored by the German Gesellschaft für Weltraumforschung (Society for Space-flight Research). The Congress was opened by the West German Minister of Transport, Dr. H. C. Seebohm, who told delegates that, because of her past record in rocket research, Germany would keep in touch with modern developments and contribute wherever possible. He himself was a member of the G.f.W. (a corporate member) and his ministry was definitely interested in the possibility of space-flight.

Dr. Sänger, in his opening address, made the point that, although the military development of rockets could do much to forward astronautics, there were many problems of non-military significance on which an international research institute for space-flight could work. One of the items to be considered by the Federation was the possibility of founding such an organization.

Other speakers included the Mayor of Stuttgart, Dr. A. Klett, and the Minister of Education for Baden-Württemberg, Prof. Dr. G. Schenkel. All the speakers emphasized the magnitude of the problems involved and the fact that only with international co-operation would space-flight be accomplished.

At the first business session, on the Monday afternoon, the final form of the constitution was agreed to unanimously by the societies eligible for membership of the Federation. These were the national societies of Great Britain, Austria, Argentina, Sweden, Germany, Switzerland, Denmark and Italy, together with the American Rocket Society, Detroit Rocket Society, Reaction Research Society and Pacific Rocket Society of the U.S. The following officials were also elected: president, Dr. E. Sänger (Germany); first vice-president, Mr. Andrew G. Haley (U.S.A.); second vice-president, Dr. L. R. Shepherd (U.K.); honorary vice-president for international relations, Dr. G. Loeser (Germany); secretary, Ing. J. Stemmer (Switzerland). Dr. Shepherd, a nuclear physicist at Harwell, is technical director of the British Interplanetary Society.

On the Tuesday four more societies were admitted to membership, which brought the total to 16, from 12 different countries. The four were the national societies of Denmark, Holland and Norway together with the Chicago Rocket Society (U.S.A.).

The Thursday and Friday were devoted to the bulk of the technical papers. The sessions were opened by the secretary, who announced that the University of Mendoza in the Argentine was founding a Chair of Astronautics and had offered the post to Dr. Sänger. There was also a German university interested in extending its curriculum to cover astronautics.

No subject was set as the main theme for the lectures this year and they ranged from highly mathematical discourses on orbits and methods of propulsion to the legal aspects of space-flight. It is hoped to review some of these papers in a future issue of *Flight*.

On the Saturday morning several films were shown, including one in colour of the Viking high-altitude research rocket and another of private Argentinean research, which showed some impressive "burn-outs." Two final papers were read in the afternoon and in the evening delegates were invited to a dinner given jointly by the G.f.W. and the city of Stuttgart. In a final speech Dr. Sänger said that the proceedings had been held in an atmosphere of great friendliness and that all motions put had been passed unanimously by the delegates. He emphasized that the Federation was international in character and would be glad to consider for membership any organization whose aims were the accomplishment of space-flight.

An exhibition illustrating the development of rocketry and space-flight was opened on the first day of the congress and by Saturday evening some 4,000 members of the public had visited it. Hundreds of photographs and drawings were included, together with many models. Some of the more impressive exhibits were an A-4 (V.2) rocket, a full-size mock-up of a space-ship cabin, and a space panorama showing an artificial satellite with a refuelling rocket and the earth in the distance.

About 60 official representatives from the various societies were present and a further 100 members attended. Besides those already mentioned, other notabilities present included Prof. H. Oberth (the "father of astronautics"), Prof. Dr. Ernst Heinkel and Dipl. Ing. E. Bachem (designer of the Natter rocket-propelled intercepter aircraft).

The next congress is to be held in Switzerland (probably Zurich) during the first week of August next year. J.H.

MR. WINSTON CHURCHILL—seen here with Mrs. Churchill and Mr. Peter Masefield, B.E.A.'s chief executive—left London in an Elizabethan last week for a holiday in Nice. He said he liked the look of the aircraft, and that he considered it to be "very suitably named in this day and age"

HERE AND THERE

Prince Nicholas in R.A.F.

UNTIL recently a member of the Oxford University Air Squadron, Prince Nicholas of Jugoslavia has been commissioned as an acting pilot officer (G.D.) in the Royal Air Force Volunteer Reserve.

Ministerial Record

MR. LENNOX-BOYD, Minister of Transport and Civil Aviation, this year completes 21 years' continuous service as M.P. for Mid-Bedfordshire.

Rhine Airfield Protest

PLANS for building a new military airfield in the Rhineland have been changed, and German proposals for a new site are being considered. Herr Peter Altmeier, Premier of Rhineland Palatinate, recently protested publicly against the confiscation of arable land for airfield-building: he said that 32,000 acres had already been taken in his state for the construction of seven airfields.

British Commonwealth Lecture

THE Royal Aeronautical Society announces that the 8th British Commonwealth and Empire Lecture, under the title of "Maintaining Airworthiness in Operation," is to be delivered by Mr. R. E. Hardingham, O.B.E., F.R.Ae.S., secretary and chief executive to the A.R.B., at the Institution of Mechanical Engineers, Storey's Gate, London, S.W.1, on Thursday, October 2nd, at 6 p.m. (tea at 5.30 p.m.).

"Bournemouth" Flies Again

THE Airship Club's little dirigible *Bournemouth* re-emerged from its hangar at Cardington (where it has been undergoing modifications since its first ascents last year) on September 8th and made two successful flights at 200-300ft and the modest speed of 25 m.p.h. Capt. Beckford Ball was in command of a crew of three, which on one of the flights included Lord Ventry, who initiated construction of the craft. *Bournemouth*, incidentally, now appears in the A.R.B. *Register of British Civil Aircraft*. It has been allotted the letters G-AMJH.

Dropped Letter

THE lynx-eyed spotters did not fail to notice at the S.B.A.C. Display that military prototypes are no longer identified by a yellow capital P painted in a yellow circle on the fuselage. In fact, the only machines seen with this marking were a Sapphire-Canberra and the first prototype Bristol 171 Sycamore, VL958—which was, incidentally, fitted with a new transparent nose. This particular Sycamore did not take part in the Display, though it was frequently seen in the air during the week.

A Notable "Flight" Drawing

IN common with *The Autocar*, *Yachting World*, *The Motor Cycle* and other Iliffe journals, *Flight* has for many years held a high reputation for striking and accurate presentation of new cars, ships, aircraft, engines—whatever the subject may be—in "cut-away" drawings. We venture to think that a new high level in this class of illustration will be reached in the next issue of *Flight* (September 26th) which will feature, in folder form, the Saunders-Roe Princess. The fully annotated drawing of this great aircraft will be some two feet in width, and will be accompanied by a detailed description of the structure and installations.

Split Seconds

AT the recent National Model Flying Festival sponsored by the *Yorkshire Evening News* at Sherburn-in-Elmet, the Yorkshire Aeroplane Club's airfield, an outstanding feature of the control-line team race was the "pit-work." One team achieved a *seven-second* refuelling; this included stopping the model rolling, plugging-in booster batteries, pressure-

MOONLIGHT ADVENTURE: British paratroopers board a U.S.A.F. C-119 Packet at Stradishall preparatory to a dawn airborne "attack" on the American base at Sculthorpe. After an advance attempt to "neutralize" the control tower had failed, the main raid was adjudged successful.

HERE AND THERE . . .

filling the 30 c.c. tank and swinging the airscrew. The machine, "piloted" by N. Butcher, lapped at 90 m.p.h. and won the 10-mile final at an average of 66 m.p.h. As a measure of the popularity of the meeting —and of model-flying in general—there was an entry of 350 for one contest (tow-line gliders) and some 15,000 spectators.

106 U.S. Bombers Damaged

ONE B.36 bomber aircraft was destroyed and no fewer than 106 of the same type damaged in the Caribbean hurricane which struck Carswell Air Force Base, Fort Worth, Texas, on September 1st. This official news is the first intimation that the U.S.A.F. possesses such a large number of these aircraft, and it discloses far heavier damage (estimated at nearly £50 million) than was at first admitted. Most of the damaged aircraft are expected to be serviceable again by the end of this month.

Wingtip Isotopes

DURING the year ended last June, the Atomic Research Establishment at Harwell sent more than 3,000 consignments of radio-active isotopes to 37 countries. Increasingly urgent demands from overseas have led B.O.A.C. to convert a fleet of Argonauts to carry the radio-active materials in special wing-tip containers. This method, which reduces cost of transport by more than 60 per cent, as it obviates the need for heavy lead containers (to protect the crews from radiation), is being considered for use on Series II Comets.

"WARTS AND ALL" was Cromwell's command to the artist who was to portray him; and in this fine new study of the third Avro Ashton high-altitude research aircraft the otherwise clean-cut lines of the machine are seen to be somewhat disfigured by undisguisable growths beneath wings and fuselage. One of the duties for which the four-Nene Ashtons were built was the investigation in advance of high-altitude bombing techniques to be employed by the new generation of jet bombers. Much of the original Ashton development flying was done by J. H. ("Jimmy") Orrell, A. V. Roe's chief test pilot.

B.O.A.C.'s Jet Crews

SIXTEEN weeks' training is given to pilots selected for the B.O.A.C. Comet Fleet, which now has 24 fully trained captains and 16 first officers. In addition, there are 20 flight engineers, 29 radio operators, 24 stewards and 22 stewardesses. A further 70 potential members of the Comet Fleet are now on conversion courses or undergoing route training. The pilots' course involves gas-turbine instruction at the Corporation's Central Training Unit, specialist training (lasting eight weeks) with the de Havilland company, a cruise-control course, local and overseas flying and route-familiarization.

Security Cargo

THE R.A.F. Hastings which flew to Australia in connection with the forthcoming atomic bomb test completed the last leg of its journey, from Darwin to Woomera, last Sunday. At the end of the flight, made under strict security precautions, several crates were unloaded, but no information was given except that the two accompanying scientists, Dr. W. G. Penney and Dr. O. M. Solandt, would fly to Melbourne on the Monday. It is now believed that the British atomic weapon, to be tested this month at the Monte Bello Islands off the West Australian coast, will take the form of a rocket warhead.

IN BRIEF

AT a selection-committee meeting held recently at the R.Ae.S. offices, nine S.B.A.C. educational grants were awarded, enabling holders to serve apprenticeships with aircraft and engine manufacturers.

* * *

Groups of senior engineering students from colleges and research establishments are invited by Wild-Barfield Electric Furnaces, Ltd., to visit their Watford works where, on weekday afternoons until May 31st, 1953, extensive tours of inspection can be arranged.

* * *

A revised catalogue of G.E.C. electrical equipment for use in aircraft has been published. Several specially built items of aircraft kitchen equipment, designed in conjunction with particular airline companies, are listed, together with lighting fittings, a humidifier unit, and aircraft cables, all complying with A.R.B. requirements.

* * *

The instructional film *Basic Principles of Lubrication*, made for the Esso Petroleum Co., Ltd., by Technical Films, Ltd., gained second prize in the scientific section at the recent Venice Film Festival; it was screened twice at the Edinburgh Festival, in both the educational and scientific sections; and it is to be shown at the forthcoming Congress of the International Scientific Film Association in Paris.

* * *

The formation of David Brown (Australasia) Pty., Ltd., is announced. With headquarters in Sydney, the new company will be responsible for the importation and distribution throughout Australasia of the products of David Brown Tractors (Engineering), Ltd., of Meltham, Yorkshire. Mr. P. J. Clifford, former export sales manager at Meltham, is manager.

Mr. Arthur H. Bull, export manager of Oldham and Son, Ltd., the battery and lighting equipment firm, is now on a three-month business tour of India and Pakistan.

* * *

The many available types of "Clatonrite" self-sealing weather strip are illustrated and described in a brochure recently published by the makers, Howard Clayton-Wright, Ltd., of Wellesbourne, Warwickshire. Forty-three standard sections are listed, and details of installation, testing and typical applications are given.

At a meeting of directors of Titanine Ltd. an interim dividend of 15 per cent was declared in respect of the financial year ending December 31st, 1952.

* * *

The British Welding and Research Association recently held its second summer school on welding, at Ashorne Hill, Leamington Spa. A total of 275 student members attended the two-week course, and over 70 lectures were given by scientists and engineers from industry, the universities and research organizations.

FARNBOROUGH FOURSOME: Stands Nos. 1 to 4 in the S.B.A.C. Exhibition housed the products of Smiths Aircraft Instruments, Ltd. and three of their associated companies, Waymouth Gauges, Kelvin and Hughes and K.L.G. Photographs of a number of other Farnborough stands and exhibits appear in the review "Static Show in Retrospect" on pages 391-394.

* TWO NAMES – ONE ENGINE

Keystone of the aerial defence of the North Atlantic Treaty Organisation, the Armstrong Siddeley Sapphire is now in quantity production in Britain and the United States of America.

ARMSTRONG SIDDELEY MOTORS LIMITED

PARKSIDE · COVENTRY

Members of the Hawker Siddeley Group

The fitting of hydraulic servo-controls—a unique feature of the Westland S51 and S55 Helicopters—has removed much of the tedium of pilotage. Coupled with the all-metal blade system they are but typical of the technical advances introduced by Westlands in the S51 and S55 Helicopters which now have well over half a million operational hours to their credit.

WESTLAND S·51 & S·55 HELICOPTERS

WESTLAND AIRCRAFT LIMITED · YEOVIL · ENGLAND

TWO-ROW LEONIDES

First Description of the New 14-cylinder Alvis Radial

FOR the past year or two there has been a requirement for a modern British piston engine in the 600 to 1,000 h.p. class; designers of both fixed-wing aircraft and helicopters have made this clear. A variety of aircraft now employ with success the rather less powerful nine-cylinder radial Alvis Leonides—the only home-produced unit of its kind. With increasing demands being made on these aircraft, and with the call for more power for new designs, it is not surprising that the Alvis Company has hastened its new unit, which may be broadly described as a two-row 14-cylinder Leonides development. The name given to this engine—Leonides Major—is itself indicative of its close kinship with the single-row unit.

The similarity of the principal components of the Major to the well-tried equivalent parts of the Leonides can be expected to reduce the development and production period from the usual five years or so to less than half that time. A Ministry of Supply development-contract has been granted, and with the makers' confidence as additional backing, this has made possible the planning of a good-sized prototype batch. Drawings have been completed, construction is under way, and the first Majors should be running in about six months' time. Two variants have been designed, one to operate with crankshaft horizontal, the other with it vertical, or intermediately inclined. They are designated A.Le.M 1-1 and 1-2 respectively. The differences between the two types are very slight, and no major conversion parts are required. The oil system is designed to operate efficiently in both planes.

Possible applications for the new engine are numerous, but highest on the priority list are probably the helicopters—Westland-Sikorsky S.55s and Bristol 173 Mk. 2s. Possible fixed-wing applications are the Prestwick Twin Pioneer and even the Percival Provost. The Pembroke is intended to have Majors at a later stage, and this may also be the first installation for flight-development purposes. It seems certain that some new two- and four-engine transports will be conceived around Leonides Majors, for they embody the latest ideas in radial piston-engine design and, apart from being unusually compact, will be of very low weight for their power.

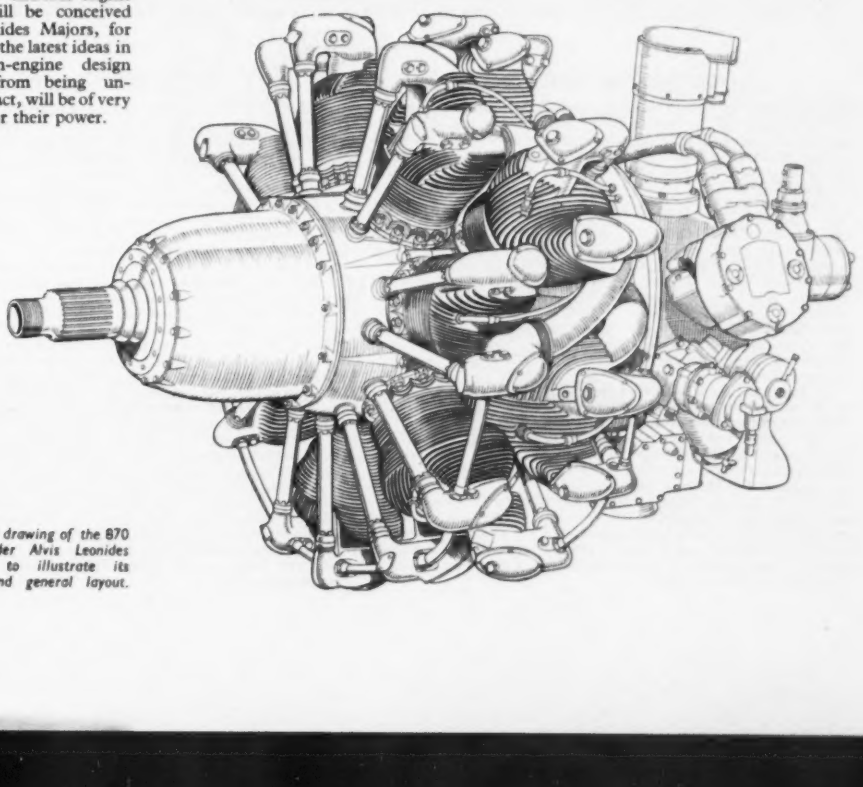
A preliminary examination of the Leonides Major reveals that it has a remarkably small diameter of only 39in. This is 2½in less than the nine-cylinder Leonides, which had hitherto been regarded as the most compact of engines. The reduction in diameter by comparison with the Leonides has been made possible by the smaller number of cylinders in the banks and by a systematic tucking-in of components towards the engine centre-line. The lower ends of the cylinders are as close together as is practically possible, and, although the connecting rods are similar to those of the Leonides and of the same section, they are shorter and so more rigid. Provision has been made from the outset for the considerable power development which is believed to lie in the Major design. Such components as the pistons and gudgeon-pins are particularly sturdy.

With so small a crankcase diameter the design of the reduction gear presented something of a problem. The Farman type, spreading the load among six satellite pinions (instead of three), was selected. Majors for fixed-wing aircraft are equipped with this 0.533 : 1 reduction gear, and the airscrew shaft—parallel splined—is of S.B.A.C. size 4. Provision is made for a hydraulic torque-reaction equipment of multi-piston type in the reduction gear.

Either de Havilland or Rotol airscrews may be fitted, with full feathering and braking facilities. It will be noted that the constant-speed unit is located at the back of the engine—contrary to European practice. This was done to ensure even cooling by keeping the small frontal area of the engine as clear as possible.

The valves are push-rod operated from two cam rings, one in front of and the other behind the cylinder banks. The very small angle of the push-rods is apparent from the drawing, an effort having been made to reduce the obliquity to a minimum.

A somewhat unusual crankshaft assembly is employed. The



This provisional drawing of the 870 b.h.p. 14-cylinder Alvis Leonides Major serves to illustrate its compactness and general layout.

TWO-ROW LEONIDES . . .

shaft, of three-bearing two-throw design, is constructed in three pieces, with the division points on the vertical centre-line of each crankpin. Splined coupling sleeves pass through the centres of the crankpins and clamping bolts with right and left-hand threads secure the assemblies. It was felt that this arrangement gave both better support and better cooling. The bearings, which are of simple white metal on a steel base, are mounted on the crankshaft, thus being provided with the best possible support.

Low-pressure fuel injection is a feature of the engine, a Hobson master control fuel-injection system being fitted. The fuel is injected into the eye of the impeller via passages in the supercharger casing, where it meets a slinger ring rotating with the impeller. To avoid the possibility of icing in the induction passages the throttle and throttle body are oil-heated. A separate fuel pump is mounted on the rear cover, and in this is incorporated a Micronic filter element. This form of fuel-injection system enables the engine to be controlled by a single lever.

Complete absence of linkage between boost control, metering unit and throttle body will give the engine a particularly clean appearance. In this latest Hobson arrangement the whole assembly is incorporated within the throttle body and the fuel pump is kept quite separate. The r.p.m. generator is incorporated in the fuel-pump assembly.

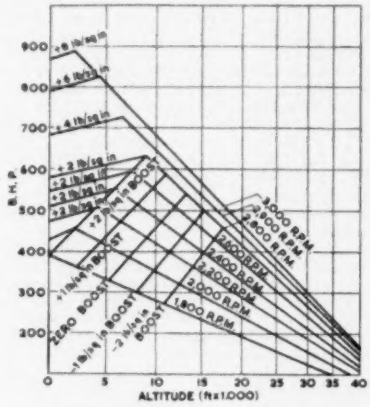
All the normal requirements of a modern engine are met—fully-screened dual ignition, oil dilution by fuel injection for cold starting; accessory drives to suit airscrew controller unit; starter; Hymatic air compressor; Lockheed hydraulic pump; Plessey vacuum pump; Rotax generator (0.75 to 6 kW); and Smiths r.p.m. generator. The particular magnetoes to be fitted are of a well-proved sealed type for 14-cylinder engines, approved for 1,000 hours' life.

Regarding the starting equipment, either a 12-jaw 24 V Rotax hand electric starter or a Plessey-Coffman cartridge starter may be fitted. Provision is also made for an independent hand-turning gear—a recent requirement.

The lubrication system is entirely self-contained and enclosed within the engine casings. The oil pump is located at the rear of the engine, with separate assemblies for the pressure and scavenge systems. Both airscrew and engine are protected from contamination by the presence of a fine-mesh filter between the pressure pump and the engine. Included in the pressure lubrication system are all components of the valve-operating mechanism.

DATA FOR ALVIS LEONIDES MAJOR

	A.Lo.M.1-1	A.Lo.M.1-2
Position of crankshaft	Horizontal	Vertical
No. of cylinders	14	14
Bore	4.8in	4.8in
Stroke	4.41in	4.41in
Capacity	1,117.8 cu in	1,117.8 cu in
Compression ratio	6.8 : 1	6.8 : 1
Supercharger ratio	6.5 : 1	6.5 : 1
Diameter	38.925in	38.925in
Maximum length with accessories	70.896in	54.858in
Fuel grade	100/130	100/130
MAX. TAKE-OFF OR 5-MIN. POWER:		
b.h.p.	870	870
r.p.m.	3,000	3,000
Boost at sea level	+8 lb/sq in	+8 lb/sq in
Fuel consumption (pt/b.h.p./hr)	0.78/0.82	0.78/0.82
MAX. CONT. POWER:		
b.h.p.	730	700
r.p.m.	2,900	2,900
Boost	+3½ lb/sq in	+3½ lb/sq in
Altitude	7,000ft	7,000ft
Fuel consumption (pt/b.h.p./hr)	0.65/0.69	0.65/0.69
MAX. WEAK-MIXTURE POWER:		
b.h.p.	515	515
r.p.m.	2,600	2,600
Boost	0	0
Altitude	11,000ft	11,000ft
Fuel consumption (pt/b.h.p./hr)	0.525/0.555	0.525/0.555
MAX. OVERSPEED CONDITION (20-SEC. LIMIT):		
r.p.m.	3,150	3,150
Boost	+8 lb/sq in	+8 lb/sq in



Altitude performance curves for the Leonides Major.

A VICKERS RETIREMENT

WITH more than forty years' service with Vickers-Armstrongs, Mr. Bonner W. A. Dickson retired on August 31st on attaining normal retirement age. At the same time he relinquished his seat on the board of directors of Vickers-Armstrongs, Ltd., and his duties as general manager of the aircraft section.

Following the 1914-18 war, Mr. Dickson took over the management of the company's works at Dartford in Kent, a position which he held until the outbreak of war in 1939. He was then sent to Manchester to reconstitute the Openshaw Works and in 1940 was transferred to the aircraft section as assistant general manager.

Mr. B. W. A. Dickson.

In 1941 the Castle Bromwich factory, built by the Nuffield Organization, passed to the control of Vickers-Armstrongs, and Mr. Dickson was appointed works director on behalf of the Ministry of Aircraft Production. Here he was responsible for the production of Spitfires and Lancasters. At the end of the war he was appointed director and general manager of the aircraft section of Vickers-Armstrongs and in 1947 he carried out a goodwill mission in one of the company's Viking aircraft to India, the Far East, Australia and New Zealand.

AN URGENT NEED

IN a Battle of Britain Week appeal, Lord Riverdale, G.B.E., chairman of the council of the Royal Air Force Benevolent Fund, speaks of aircraft and engines that have made 1952 a red-letter year for British aviation. He continues:—

"The nation is proud of these machines and of the men who fly them—believing that British pilots, no less than British aircraft, are matchless. Industry owes a debt for their skill to the Royal Air Force, in which most of these men were trained. Today, as Battle of Britain Week approaches, may I ask your readers to spare a thought for other airmen less fortunate.

"Last year, the Royal Air Force Benevolent Fund gave financial help to 24,143 cases—spending more than £640,000 on relief of their distress. There are now more than 150,000 helped cases on our books: over £5 million has been spent since the Fund's inception in 1919.

"During the past year public contributions to the Fund have ranged from half-a-crown from an old-age pensioner to large donations of £1,000 and over from individuals or firms. All are warmly welcomed because they show how firmly the Royal Air Force is entrenched in the hearts of people in every walk of life.

"I am sure there is no one who, having taken thought, would deny that we owe our very existence to that Battle which gained us time to gather our strength. May I therefore appeal to all to send a donation, however small, to help continue the work on behalf of R.A.F. personnel and their dependants in distress—work which is increasing as war veterans grow older and times become more difficult. During the past three years the Fund's expenditure has exceeded income by more than £600,000, so the need is urgent.

"All contributions will be thankfully acknowledged by the R.A.F. Benevolent Fund at 67, Portland Place, London W.1 (Tel.: Langham 8343)."

Do you know your airfields?

27

Recognise this airfield? It's No. 27 in this series of puzzle photographs. You'll find the answer below on the right.★

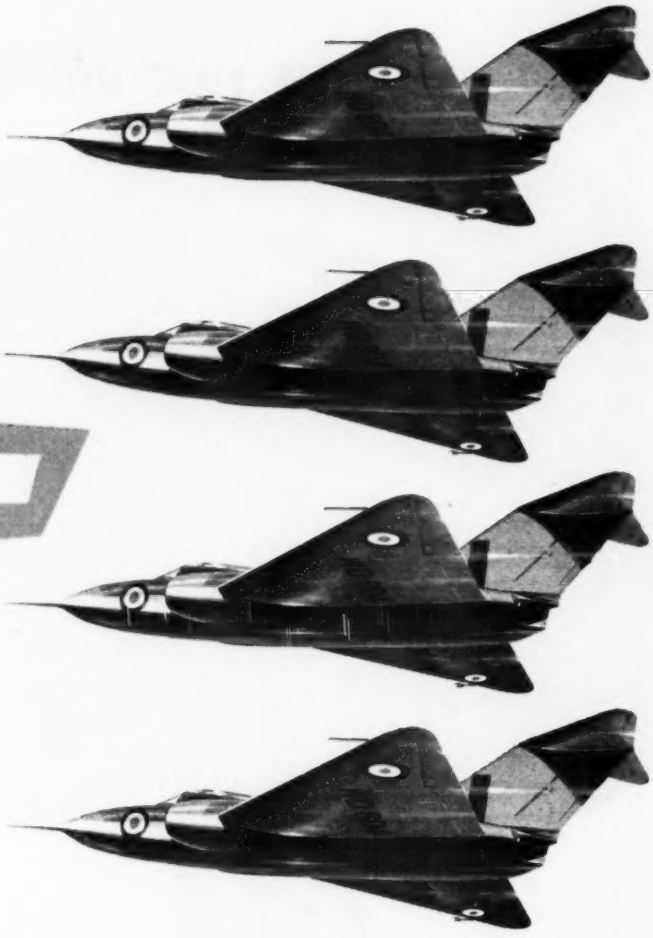
WINGS DAY
SEPT 20th
Give for those who Care

As you come in on the circuit at any major airport in Britain you can take one thing for granted: the ready welcome and brisk efficiency of the men of the SHELL and BP Aviation Service. They're always on duty—experts at refuelling aeroplanes of all makes, sizes and nationalities. These men are good at their job because they like it.

Shell and BP Aviation Service

Shell-Mex and B.P. Ltd., Shell-Mex House, Strand, London, W.C.2.
Distributors in the U.K. for the
Shell and Anglo-Iranian Oil Groups.

★ West Hartlepool.



FACTS ABOUT THE GLOSTER JAVELIN

Super Priority for the R.A.F.

Where to carry fuel, armament, engines and hydraulic, and the great complex of modern fighter equipment, has always been a thorny problem for military aircraft designers. The Gloster Javelin's Delta Planform provides ample and accessible stowage space *without* loss of overall efficiency.

GLOSTER AIRCRAFT CO. LTD.
Hucclecote, Gloucestershire.

MEMBER OF THE HAWKER SIDDELEY GROUP PIONEER . . AND WORLD LEADER IN AVIATION

A LAYMAN AT FARNBOROUGH

What the Flying Display Means to One Wholly Unversed in Technicalities

IN character, this article contrasts with the majority which appear in our columns. We print it because it helps to explain the spell which, each year, the Flying Display casts over tens of thousands. The aeronautically informed (and others who like to be thought so) seem shy of confessing to anything other than intellectual stimulation. This writer has no such inhibitions.

By JAMES SMITH

I HAVE no knowledge of the design of aircraft or of the construction of jet engines. I do not appreciate one hundredth part of the tremendous problems their creators and the technicians who work with them have to solve. I go to Farnborough for the thrill of the flying display. My senses are almost completely satisfied by what I see and hear.

In fact, the greatest impact on my untrained mind is made through my ears. It is easy to listen to the piston-engined aircraft, even the four-engined ones. The difference between them and the jets is rather like the difference between an electric train travelling overland, with plenty of space for its sound to disperse, and a tube train, in which the racket cannot escape and is thrown back at the traveller with much greater intensity. This is not to suggest that the sound made by even the noisiest aircraft is distressing. Even if it is tough enough to make a strong man flinch (and this often happens) it is exciting and exhilarating.

When a jet idles on the tarmac, there is a rough, harsh noise, reasonably loud, but nothing special. Then, as the pilot prepares to taxi off, it intensifies tremendously. The air behind him quivers; and objects seen through it shimmer, as though seen through water, or perhaps through an extremely intense heat-haze.

The noise increases as the machine begins to move, and as it passes you hear a deep thundering rumble which echoes inside your own diaphragm. Then he's away. His nose is up, and in a few seconds he's a long way off, climbing, and leaving behind long trails of darkish smoke. When he goes into his act in front of the enclosure you hear exactly the sort of noise with which jet aircraft have become associated. There is that roaring sound which echoes all round the clouds, and occasionally a bit of a scream.

But you get the best impression when the pilot flattens out to come past, practically at ground level, at anything above 500 m.p.h. He approaches with a quiet, whispering whistle, terrifically fast, and then, as he passes, the most enormous sound batters your ears. It is a great thick violent crash of sound that can send you ducking for cover before you realize what's happening. By the time you look up he's twenty miles away and turning in a tremendous sweep.

That is the sort of noise the Canberras and Meteors make, but the Hunter and the Swift have a quite different note. As these approach, with that ghostly whistle, you steel yourself for something pretty special. Then there's a tremendous scream—agonisingly powerful but mercifully short—which seems to tear your stomach apart.

It is difficult for a man like me to appreciate the skill and the significance to aviators which there must be behind the climbs, turns and twists which go into these "acts." I can gasp when a machine goes straight up in the air, directly defying the law of gravity, at about 500–600 m.p.h. I can only watch and wait when a chap does five falling-leaf turns in succession: but I cannot analyse the special skills entailed.

Probably for the same reason, there is nothing exceptionally striking to me about the performances of the Canberra, the Comet or the Britannia. I gather there is something valuable in the Comet's assisted take-off, and I wonder whether any of the Canberras I am seeing is the one which made the double flight across the Atlantic.

The slow run in of that aircraft with a Scottish name is quite interesting, but for sheer straightforward interest and entertainment I go for the helicopters. They defy every effort of the imagination to detect how they perform their crazy movements. You see two up practically waltzing together. They swing their backsides round, like elephants backing out of a circus ring, or they climb slowly and heavily, like a fat old woman going upstairs. Sometimes they skate kittenishly about the airfield, leaning this way and that, and then stop, and quite slowly and deliberately walk sideways, keeping perfectly straight, about four feet above the ground.

One helicopter resembles a floating sausage. It is like a railway carriage with two small pairs of wheels at each end, and on top two huge rotor-blades. At the pilot's end the blade is just a little smaller than the other, but it stretches quite a way beneath the arc of the other, which is mounted on a contraption resembling a butterfly and Carmen Miranda's Easter bonnet.

When it rises from the ground the pilot's end comes up first, only a few inches, but it is exactly like a sausage-dog trying to sit up and beg, and finding his body too long for the effort.

Between all the different sounds comes the voice of the commentator, friendly, chatty, making an occasional joke, and sometimes giving a genuine word of praise for the boys who pilot these new machines.

He explains that the top job of the show, the Hawker Hunter—a beautiful gleaming piece of slender sculpture—is going up out of turn because the pilot, Neville Duke, thinks he might have a go at some of this supersonic stuff. Off goes Duke, straight through the clouds, and for another quarter of an hour or so you watch and gasp at the wonders of the Valiant (that great silver spider with four engines, said to be so powerful and fast that though it is a bomber it needs no gunners to defend it), at the Avro delta-wing bomber (like a great white moth, with its escort of two smaller delta-wing aircraft), and at the new delta-wing fighter (the Gloster Javelin).

The Javelin has a beauty all its own. All it comprises, it appears, are two jet engines placed side by side in the centre of a short broad wing turned backwards, with a funny little tail perched somewhere off the stern, as though it had been added for good luck. But it can fly. It doesn't show you all it can do: merely a few turns and loops, with an occasional roll, as if to let you know that the little paper dart is much more than a toy.

Over the loudspeaker comes the voice of the announcer warning you that Duke is getting ready to dive. You can see nothing. The clouds are all round. He says that Duke is 44,000 feet up and about 30 miles away, and that any moment now he's going to start his dive in an attempt to exceed the speed of sound.

In a minute, quite calmly, he tells us, "Duke has begun his dive."

There is absolute quiet. There are ten thousand people and fifty jet aircraft on the field, yet you can hear an electric train passing through the countryside more than a mile away. The hill is crowded, and everyone stands silent and looks up at the grey clouds.

There is nothing to see, nothing to hear. Then, after a full half-minute, comes a double bang, just like an anti-aircraft gun going off. Everyone smiles and laughs. "He's done it." Strangers talk to each other. Then people start looking for Duke. The bang came from behind the hill, to the south, but in another minute, at the other end of the horizon, probably ten miles away, you see a small black shape, shooting across the sky. By Heaven, it's shifting!

And here he is. A flash, a scream, a flinch and a twist of your intestines; and the Hunter is 20 miles away in the opposite direction. Then Duke slows down to a mere 500, and shows his pretty piece off in front of you, in curves and climbs and graceful dives.

Then he comes in to land, almost silently, his engines sounding like fingers sliding over a piece of silk. And as it begins to rain the announcer tells you that a voice has put a call through to the control tower asking "if we got a bang."

Then he says that another chap, in the D.H. 110, has taken off from Hatfield, and that he, too, is going to have a go. Surprisingly soon, he says the D.H. is at 44,000 feet and has begun its dive. Almost automatically comes the double bang. The sonic barrier has been pierced again.

This is two days before the tragedy to John Derry.

It takes me some sixty minutes to cover the 200 yards to the gates—just about a speed of an eighth of a mile an hour. While you are waiting you hear another double bang, and think that these pilots must surely have had enough. And next morning the newspapers tell you that an American pilot, in a Sabre flying over the area, was responsible for this particular contribution.

There is one other reason why the Farnborough means so much to me. It isn't a "show" in the accepted sense of the word. There is nothing about it which has been dramatically contrived or designed purely for effect. It's all real.

Our American Correspondent Reports . . .

NOBODY is more aware than the Americans that the modern aeroplane—whether military or civil—is becoming far too complicated. On the civil side, the ever-increasing complexity of operation, the continual addition of equipment to the cockpit, and the tendency to load the pilot down with more and more instruments (instruments which, because of their number and the limited room available, are becoming smaller and smaller) can only result in an actual decrease in safety. Certainly the pilot likes gadgets that make his work easier or his reactions or his flying more reliable. But modern development produces such a plethora of new ideas—many of them admirable enough in themselves but perhaps of doubtful value when mixed up in a cockpit with a lot of others like them—that the poor fellow is utterly swamped. Moreover, no airline likes to disregard a new piece of equipment. There is always a haunting feeling that to do so might result in an accident which the inclusion of this particular gadget would have avoided. There is also technical pressure, sales pressure, to-have-the-latest pressure, and the natural desire to do everything possible to reduce the difficulties that beset the pilots. But in the end it is the fellow who flies the aeroplane who is likely to be killed by kindness.

One has only to talk to some of the airline pilots here in America to find a growing feeling against this continual increase in cockpit instrumentation; certainly against the inclusion of instruments with dials that are small and hard to read. It would not be surprising if the Air Line Pilots Association (provided it continues under the active and excellent leadership of the young and practical men who took control in 1951) turned their attention to this aspect of their members' troubles and, perhaps in conjunction with some organisation like the Flight Safety Foundation, tried to clean up the situation.

• • •

ON the military side, not only does flying safety enter into the picture, but also weight and cost of the airframe and its equipment, to say nothing of performance. Here again the inevitable pressure of technical progress takes a hand. There is always a better piece of gadgetry available which will make the aircraft a more deadly weapon, or make the pilot more efficient, or even make him more comfortable. The dangers inherent in trying to produce all these results in one machine have been highlighted in Sabre *versus* Mig battles, when a difference in combat weight of over 5,000 lb. gave the edge in performance to the latter. It was the story of the Japanese Zero versus our 1941 fighters all over again. This, of course, is not news to anyone concerned with military development, but it sometimes takes a brave man to come out in the open and cry "Halt," particularly if this means the elimination from future designs of some of the equipment which may affect the pilots' equipment or comfort. But a week or two ago one of the best-known aircraft engineers on the West Coast of America did do just that, and it seems likely that from now on there may be a change in emphasis on some aspects of design and equipment in American fighters.

• • •

IN this connection *Aviation Week* recently published an amusing fable. Condensing severely, we may say it's about a stone-age type who owned a club of mediocre performance. Finding that his enemies wouldn't stay knocked out, he increased the a.u.w. with a couple of rocks. But then he found that it flew out of his hand; so he added a wrist-thong. The next battle was a grand one, but this time the two warriors clashed clubs, and both weapons split into splinters. Having finished off his opponent with hands, feet and teeth, our friend got down to a really advanced design—he found two flattish stones and a leather thong and lightly lashed them to the new club, which he had selected carefully for size, weight and swing. Then he wrapped tough animal gut over the whole works. This, he thought, is a club. It was heavier, he admitted, and it swung a little harder, but it sure was lethal . . . It was more unwieldy than it had been at the start, but the man realized this was the price for increased killing efficiency. And then one day he tangled with a character from the next village. It promised to be an easy fight because the man knew he'd win as soon as he got that club swinging. But he never quite made it. Before he got that high-quality club operating, the character from the next village—using a very ordinary club picked up from under a tree—stepped in and beat the daylights out of the man. *Moral: Are combat airplanes too complicated?*

• • •

IN a recent offering, this column remarked on the dangers (arising from difficulty of reaching exits) inherent in high-density transports in cases of even minor accidents on the ground, or of ditching. The Civil Aeronautics Board has now proposed a new regulation to govern the maximum number of passengers that may be carried in American transports, the totals being based on the exits available and on Civil Aeronautics approval. The proposed figures for some of the larger machines are as follows :—

	No. of Passengers
Boeing Stratocruiser	96
Convair 240	53
Douglas DC-3	35
Douglas DC-4	86
Douglas DC-6	87
Douglas DC-6B	96
Lockheed Constellation	87*
Lockheed 1049	95

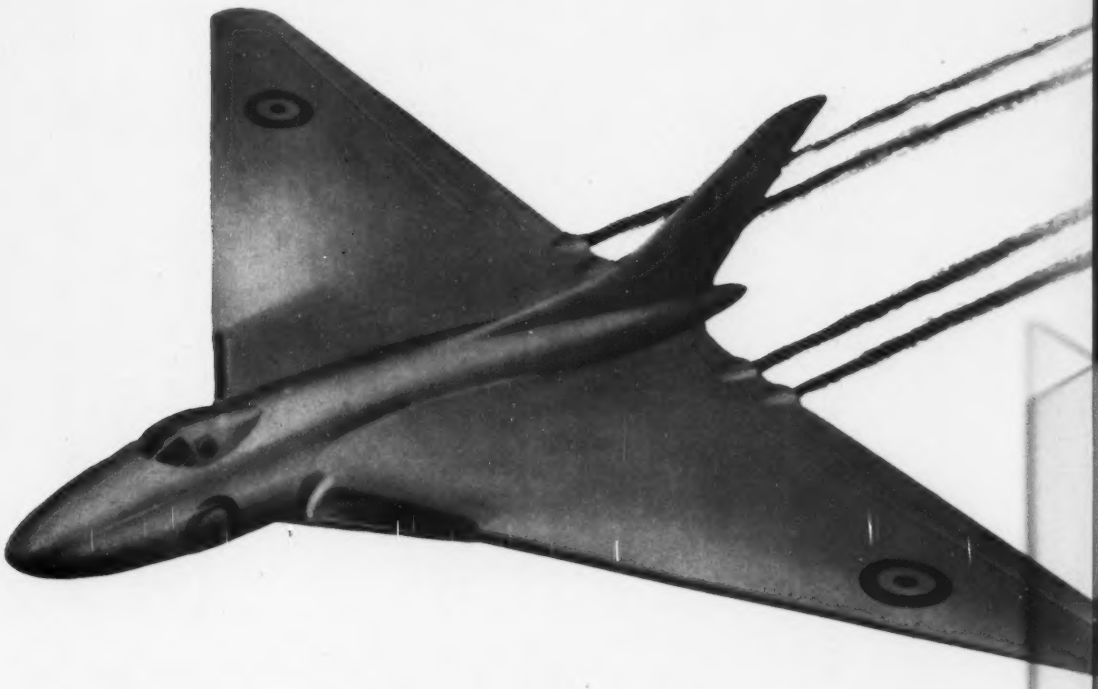
* With a reduction if exits are limited.

• • •

LARGELY as a result of *force majeure*, there seems to be a fundamental difference in thinking between certain sections of the American Aircraft industry and our own in regard to the development, and the proper place for, the turboprop transport. Lockheeds, in particular, don't recognize the necessity of building a specific aeroplane to take turboprops. They say that re-engined existing airframes can fill the bill until such times as the pure jet comes along. And with that amazing pre-war design of theirs, who shall blame them? They expect the Constellation 1249B, with turboprops and an all-up weight of 150,000 lb, to be every bit as efficient as our Bristol Britannia—and without any teething troubles, anyhow as far as the airframe is concerned. This aircraft, coming, as it will, from a long line of highly successful ancestors, and backed by Lockheed's world-wide experience and servicing organization, is going to be hard to beat. But it will be expensive; for the price of only one complete power unit (a Pratt and Whitney T-34 and a Hamilton Standard propeller) cannot be less than 200,000 dollars (or 800,000 for the four), and if this is so, the total price for the complete aircraft may be nearer three than two million.

Yet if one looks back over the history of this aircraft, the "stretch" it has achieved is remarkable. Designed before the war, and built during the war for the U.S. Army Air Force, the original version started out with an all-up weight of somewhere about 80,000 lb. By 1946, when it was introduced into civil operation, the figure was up to 90,000 lb, and was increased to 100,000 lb for the Series 749. Speed and range went up, and so did the cost price. In the early days a figure of 800,000 dollars was mentioned, but today the 1049C is double that. Yet with every model, the machine became more popular and more efficient, and a better buy for the operators. Today the 1049C has a take-off weight of 130,000 lb, and it is expected that the 1049G will make 133,000 lb.

Both these types are to be fitted with the Wright Compound engine, and first deliveries will go to the U.S. Navy (to be known as the R7V-1.). The 1049G is so designed that it can be modified to take turboprops when they are available.



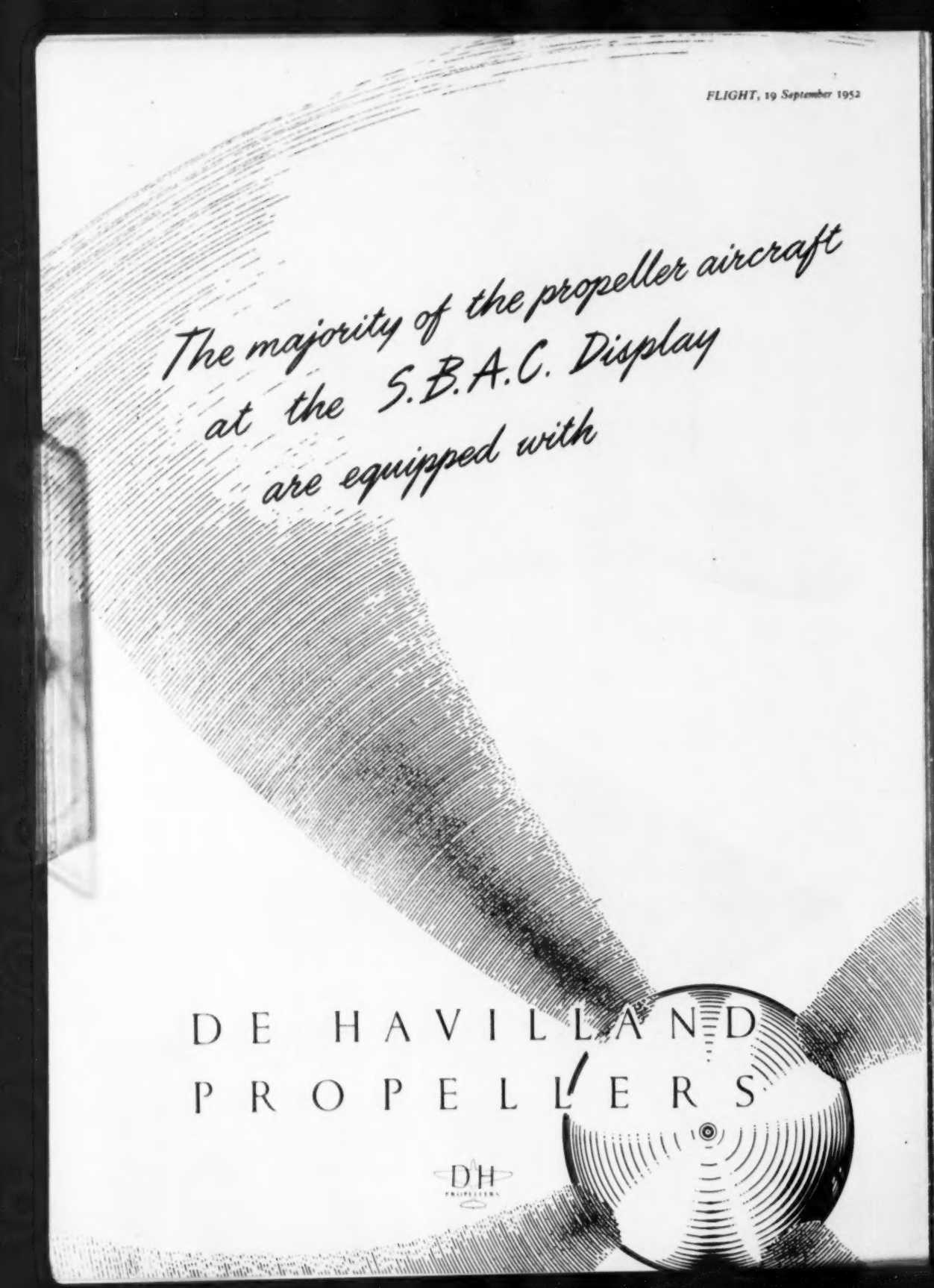
Avro 698 World's First Delta Bomber

After years of pioneering and successful flight research, A. V. Roe & Co. Ltd., announces the

aircraft flying today.

A. V. ROE & CO. LTD. / Manchester
MEMBER OF THE HAWKER SIDDELEY GROUP
PIONEER . . . AND WORLD LEADER IN AVIATION

The majority of the propeller aircraft
at the S.B.A.C. Display
are equipped with



DE HAVILLAND
PROPELLERS

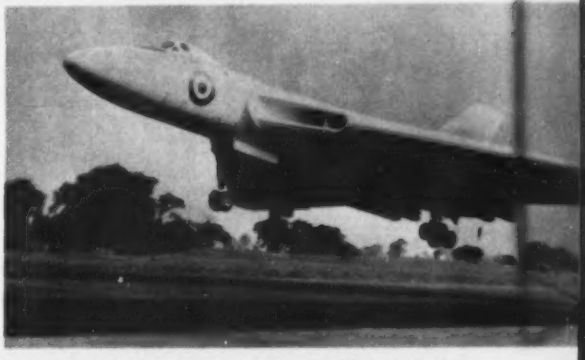
DH
PROPELLERS

At close range it can be seen how, inboard on the delta wing of the Avro 698, the point of maximum thickness has been sharply swept forward.

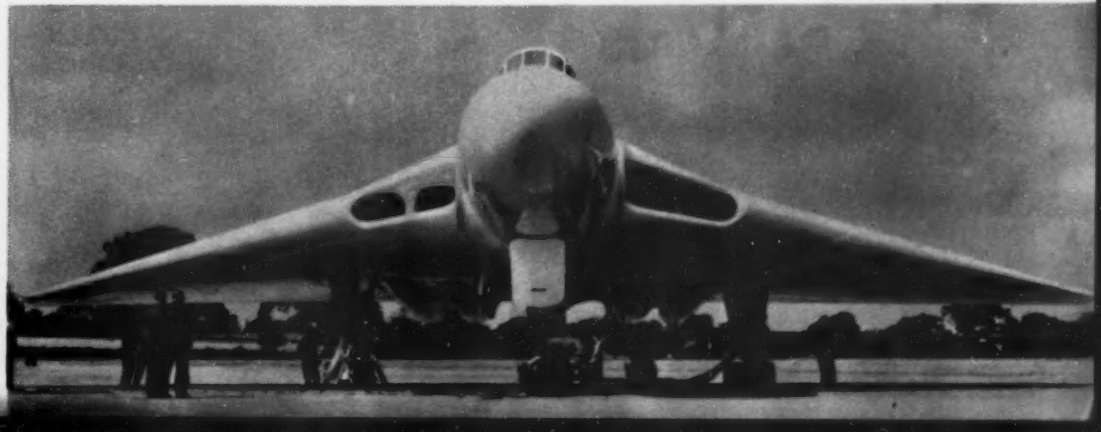
698

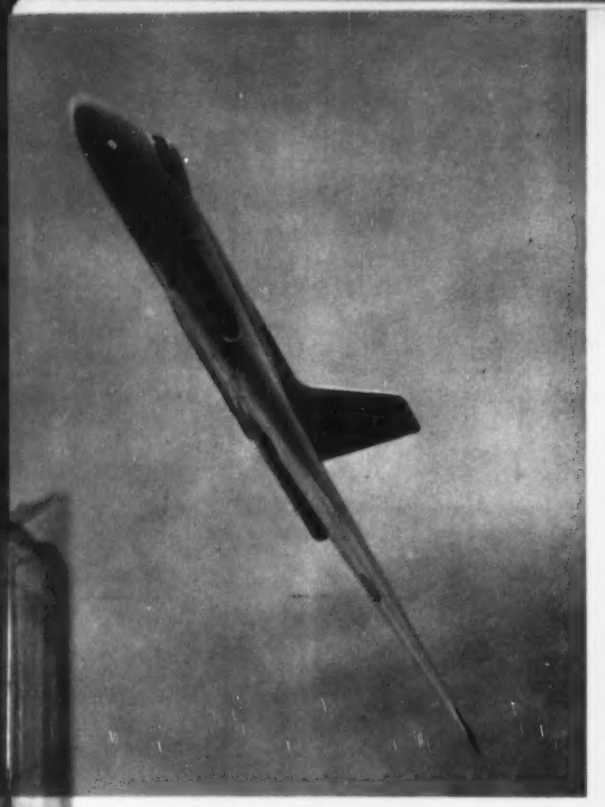
Avro Delta Bomber

ONE of our more agreeable tasks at this time of the year, with the bustle of the Farnborough Display behind us, is that of garnering the sheaves of photographs secured on, or in connection with, that occasion, and of studying, sorting and arranging them. Sometimes this occupation can prove more instructive than witnessing the Display itself, for the semi-secret machines, which are not available for close static inspection, are "stopped in flight" by the camera and many of their features clearly revealed. An excellent case in point is the Avro 698 delta bomber—surely



The take-off study above shows the trail angle of the main bogie undercarriage units; in all, there are 18 wheels. Note in the frontal view, below, the internally bifurcated intakes for the R.-R. Avons.





The four ground-to-air views, secured at Farnborough, impart a wealth of in
Bank on the right, epitomiz

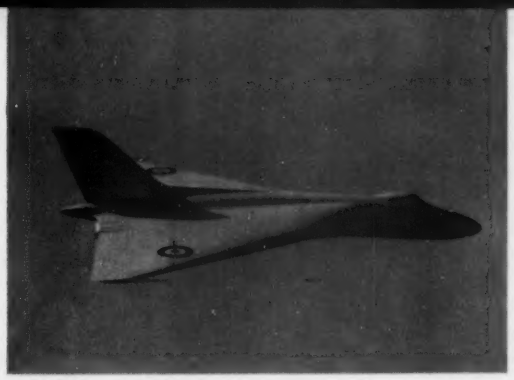
698

one of the most photogenic machines ever to take the air, and the theme of this pictorial presentation.

The photographs form, we suppose, one of the most striking sets of their kind ever assembled; even so, they hardly convey the delight of seeing the great white delta wheeling in a blue sky. It is strange, indeed, that this latest instrument of atomic warfare should rival a clipper ship in grace and beauty.

Like others who recognize that the naming of a new aircraft may be of far-reaching importance, we have been considering at odd moments a suitable appellation for the 698. Names being a matter of individual taste, we (by which is implied the present writer) advance our proposals with diffidence. Reactions will be both varied and violent.

In the first place, we are of the opinion that, other things being equal, alliterative names such as Vickers Valiant are most desirable, and one that leaps to mind for the 698 is Avenger. That this was conferred upon an Avro fighter of long ago need not prejudice its acceptance today, for the fighter was a little-known "one-off"; it is, however, firmly ruled out by the continuing employment of similarly entitled carrier-borne Grummans. For a similar reason Apollo must be discounted, and in any case, the names of mythology are not ideally suited to this unique British achievement. Following the Javelin, of course, Assegai calls for serious consideration. But, having duly pondered these and several other names, alliterative and otherwise, we offer Albion—the ancient name of England, easy on the tongue, resonant and noble on the ear (and in this choice we were in no wise influenced by the parrot-croak "perfidious"). For a commercial development we consider Aurora to be beyond reproach.



Formation on the aerodynamic design of the 698. The air-to-air study below, with Chesil es the magnificence of the new bomber.

Of very modern appearance, the factory is connected to the main terminal at Schiphol by taxi-track, road and canal.

FOKKER'S NEW FACTORY

Impressive Plant at Schiphol Airport: Current Activities Reviewed

HOLLAND'S steady and determined recovery from wartime isolation is nowhere better expressed than at the superb new Fokker factory at the Amsterdam airport of Schiphol. The plant itself, which has been in operation since the beginning of the year, is situated in open ground about 1½ miles from the terminal area, where Fokker's have a flight-shed; aircraft are moved from factory to airfield *via* a direct taxi-track running past the new K.L.M. hangars. The design of the building is plain and functional, but the high proportion of glass used—windows are enormous by English standards—gives an attractively bright impression both in the buildings and outside.

At Schiphol, Fokker's now have at their disposal some 385,000 sq ft of factory-space and a further 75,000 sq ft for offices and stores. They have also retained two hangars in the old factory at Amsterdam with a floor area of over 100,000 sq ft. At present the company has about 2,000 employees (of whom some 65 per cent are classified as "highly skilled"), but this figure is increasing and could reach 3,700 if required. It is encouraging to learn that so far there have been no strikes in the new factory and that "there are only very few people with adverse tendencies." Equipment of the factory is comprehensive and includes tools and fixtures for spar-milling and -drilling, spot-welding, jig-boring, centreless grinding and thread-rolling and a 2,400-ton tubber press. The inspection and instrument departments are provided with the latest measuring and checking equipment.

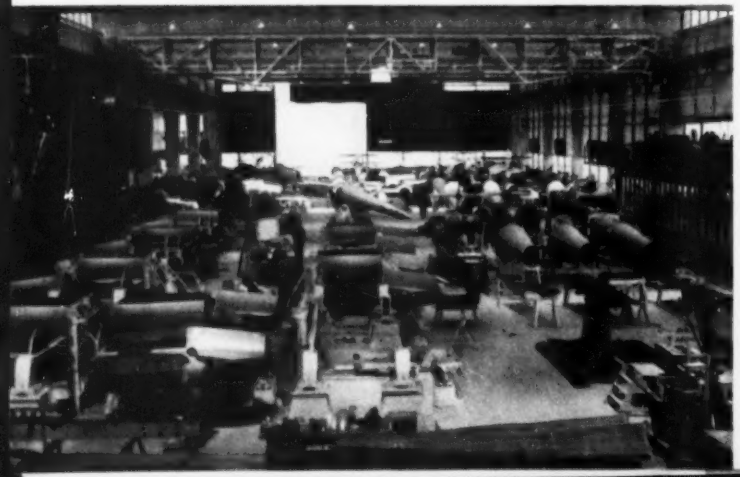
Building of the S.11 Instructor has now stopped (although it could be resumed at short notice) and the factory's main productive effort centres on the building, under licence, of 300 Meteors for the Dutch and Belgian Air Forces. An additional 30 are being supplied to Avions Fairey for assembly and delivery to the Belgian Air Force. About 130 Meteor 8s have been built to date and the entire contract should be fulfilled by the end of 1953. Fokker's build the entire Meteor airframe except for the Dowty undercarriage, and the nose-sections, which are supplied complete by the Aviolanda company at Papendrecht.

So far Fokker have received no contract from the North Atlantic Treaty Organization for the production of a Meteor-replacement, although they hope to build the Swift or Hunter under licence. It would probably take two years to tool-up for production of a complex modern fighter, and Fokker's were pointing out as far back as last December that only an immediate order could prevent a period of idleness in the Dutch aircraft industry.

Recently the Dutch company was awarded a contract for the construction of six Scandia twin-engined airliners, which will probably be delivered within two years. Aviolanda will build the wings and fuselages, jigs being supplied by the makers, Saab, who are at present fully occupied with work for the Swedish Air Force. The Fokker plant will be responsible for final assembly.

Until last year Fokker had expected to receive a Dutch Air Force contract for forty S.13 twin-engined crew trainers,

(Below) Main assembly-line for Meteor 8s in the new factory at Schiphol. Over 130 Meteors have been built by Fokker for the Dutch and Belgian Air Forces. Mach-Trainer is the name given to the Fokker S.14 (right); an initial batch of 20 has been ordered.



The Bristol 173 Helicopter is fitted with two Alvis Leonides Engines

ALVIS

LEONIDES

ALVIS LIMITED COVENTRY ENGLAND

From Piano Wire to Actuator

BY BERNARD HOLLOWOOD

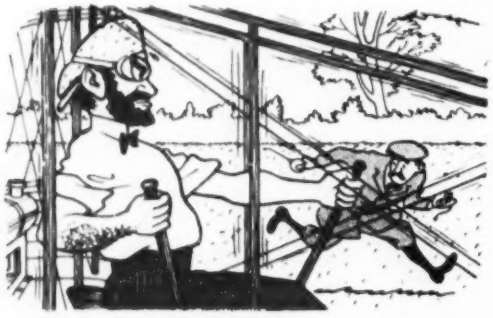
THERE was a time when aircraft controls were operated manually. Lying there in his crate of wood, canvas and piano wire our pioneer aviator would tug at his levers and thrust elastic-sided boots at his pedals. (What's that? Elastic-sided boots weren't worn in those days? So what! Who's writing this article?) Well, as I was saying before I was interrupted, the aviator would pull and tug and the pulleys and cables and shafts would wheeze and hawk as they transmitted muscular effort to elevators and ailerons.

The machine would respond (possibly) to the pilot's vigorous promptings, a wide grin of satisfaction would spread across his goggled features, and people in the fields below would hurl their hats into the air.

Ah, those were the days!

Forward! The leaves fly from the calendar and disperse like confetti. Weeks and months blend and blur . . . Lloyd George . . . Warwick Armstrong . . . the Weimar Republic . . . earthquake in Japan . . . Suzanne Lenglen . . . the "flapper" vote . . . talkies . . . television . . . Tobruk . . . Little Mo . . . (the technique is familiar, is it not?)

And here we are in 1952.



We live in push-button times, and finger-tips are now more important than biceps. A modern aircraft needs no cables and pulleys, no paper fasteners, scotch tape, safety pins and lengths of knotted string to link its control cabin with its movable extremities. Nowadays the pilot prompts the actuators, and the actuators move into action with certainty, efficiency and economy.

The actuators used in modern aircraft operate flying control surfaces, engine controls, fuel cocks, air-intake shutters, propeller pitch-changing mechanism, and so on. By converting hydraulic pressure or electrical energy into linear or radial motion they relieve the pilot or engineer, as the case may be, of a considerable amount of manual labour, and by actuating at the point where power is required they cut out the need for weighty and cumbersome paraphernalia of transmission. Also, they make it unnecessary to lead engine fuel and oil pipes into the aircraft cabin.

Their dimensions vary, of course, with the operation, but an efficient minimum size (and, therefore, maximum saving in weight) can only be achieved if adequate lubricants and hydraulic fluids are available—lubricants capable of carrying high loads between moving surfaces of minimum area.

Esso lubricants.

Grease or oil.

Lubricants of star quality are essential here. They must be exactly right—neither too thick at low temperatures nor too thin at high, for changes in consistency affect the rate of operation of the actuators. And they must be of low volatility, since the oil capacity of these actuator-things is usually small.

Esso, then.

Now, as in the days of flying piano-wire, wood, canvas and treadles . . .

It pays to say

ESSO

FOR ALL PETROLEUM PRODUCTS

ESSO PETROLEUM COMPANY, LIMITED, 36 QUEEN ANNE'S GATE, LONDON, S.W.1

Modern Dutch interior: Fokker's are rightly proud of the bright and spacious canteen, seating 1,200, in their new factory at Schiphol.

FOKKER'S NEW FACTORY . . .

but—unfortunately for the company—America presented Holland with 40 Beechcraft trainers under the Military Aid Programme. Ironically enough, a visiting U.S.A.F. General is reported to have admired the S.13 and enquired about possible delivery dates; apparently America was short of suitable crew trainers.

High hopes are pinned on the S.14 Derwent-powered jet trainer, of which an initial batch of 20 are to be built for the Dutch air force. Recently named Mach-Trainer, the S.14 is said to be an ideal aircraft for jet conversion—economical, docile and having the increasingly popular side-by-side seating arrangements for instructor and pupil. By comparison with modern jet fighters its performance is modest, but its limiting Mach number in a dive is claimed to be higher than the Meteor's—0.835 compared with 0.82 for the more powerful British fighter. The prototype Mach-Trainer is unarmed but production versions will carry two 20mm guns beneath the fuselage in a "Speedpak"-type fairing. Airframes will probably be built in three sections instead of two, as in the prototype.

According to Fokker there is a chance that the S.14 will be adopted as a standard jet trainer not only by N.A.T.O. but also by the U.S.A.F. They claim, in fact, that in every respect but weight the aircraft meets exactly the requirements set out in a specification for a jet trainer issued recently to the American industry, and that the weight stipulation is, in any case, impossible. In July, the Fairchild Engine and Aeroplane Corporation acquired a licence for production of the S.14; this company has subsequently acquired the U.S. sales agency for all Fokker aircraft—the training types previously mentioned and the F.27 Dakota-replacement, which is the subject of design studies by the Dutch company. Construction of the F.27 (which will be named Friendship, or Freightship if used for cargo) will not begin unless a contract is awarded by the N.I.V. (Government research centre). Preliminary design proposals, illustrated by a mock-up in the Schiphol factory are for a twin-turboprop aircraft with capacity for some 32 passengers. It would be a high wing type with circular-section pressurized fuselage, nosewheel undercarriage and single fin and rudder.

The America company has, in return, given Fokker the rights for sale, repair and service of its products in Europe—a concession which at present applies mainly to the C-119 Packet transport used by the U.S.A.F. The Fokker plant is well equipped for repair and overhaul work, and since 1946 the company has handled something like 400 aircraft of varying design, including over 100 Dakotas.

The Dutch aircraft industry is not only capable of overhauling all the country's military aircraft but would also be ready to undertake similar work for other countries. The industry's productive capacity has been measured as 16-40 aircraft monthly, with the Fokker works making the greatest single contribution. Despite the prospect of N.A.T.O. contracts for production of aircraft designed elsewhere, Fokker's are anxious that their ability to design and develop prototypes should not be overlooked—a sign of the healthy independence which characterizes this progressive Dutch company.

R.B.

A FUNDAMENTALLY NEW STRAIN-GAUGE

IN its basic conception the strain-gauge is, perhaps, the simplest research tool employed in the aircraft industry. Its operation depends solely upon the fact that a long, thin wire will have a greater electrical resistance than a short, "fat" wire of the same volume. To increase sensitivity, strain-gauges have, in the past, been wound from a considerable length of very fine wire doubled back on itself many times in a zig-zag pattern. The wire typically has a diameter of about 0.001in and may be wound on a jig and cemented to a thin paper backing; the free ends then have to be soldered or spot-welded to more substantial lead-out wires or tags which are ultimately connected to the strain-measuring circuit.

It will be appreciated that this process requires much manual skill and dexterity, while special precautions have to be taken with the object of ensuring, first, the soundness of the electrical joint at the ends of the resistance wire, and, secondly, against failure at the joint due to electrolytic action or the presence of corrosive flux.

Saunders-Roe, Ltd., experienced a number of strain-gauge failures during development work on the Princess and the company's helicopters. In the former case, the offending gauge could be disconnected from its terminal block and replaced easily; but on rotary-wing aircraft replacement of a gauge is far more difficult, and certainly cannot be undertaken during the course of a test. Efforts to improve performance of the gauges soon suggested that a radically new approach to the problem was desirable.

Attention was turned to the "printed" electric circuit. After rejecting several types, Saunders-Roe approached Technograph Printed Circuits, Ltd., who co-operated enthusiastically and, in fact, delivered the first batch of experimental printed gauges before Saunders-Roe were fully ready with testing procedures. The gauge which T.P.C. developed was based on a thin sheet of thermo-setting plastic on which was cemented a very fine layer of alloy foil. Over this was printed an inked pattern in the form of a strain-gauge. The lacquer and metal sandwich was then etched in an acid bath until the only metal remaining was that protected by the ink. Removal of the ink then disclosed a perfect printed gauge as shown in the accompanying drawing. In production, the gauges are cut from continuous strip. Various types of foil and cement are used for different temperature limits.

It soon became apparant that the new device—known as the Saunders-Roe Technograph Foil Strain-Gauge—completely overcame the discontinuity problem. The makers' tests showed it to have "an outstanding performance. . . . It was so much better . . . that we carried out much more exhaustive tests on further samples . . . to make quite certain that our enthusiasm had not biased our measuring technique." Saunders-Roe give these reasons for the improved performance: The absence of paper confers excellent mechanical and electrical properties; the transmission

The Saunders-Roe Technograph strain-gauge, shown actual size.

of strain from the specimen to the gauge is greatly facilitated and is further assisted by the wider sections at the ends of the printed grid; the ends of the foil form integral soldering tags to permit a good electrical joint to be made with the external circuit; and the outline fidelity of the gauge stands up well to microscopic examination. But perhaps the most important feature claimed is the very high ratio of contact area to volume of the resistance foil compared with that of a wire gauge. This results in rapid heat-dissipation and, as a consequence, in the acceptance of a working current which may be many times higher than the limiting current for a wire gauge. The sensitivity of a strain-gauge is, of course, directly proportional to the current.

Saunders-Roe have also found a number of incidental advantages accruing from the thinness and flexibility of the foil gauge, among which may be mentioned ease of application, unlikelihood of accidental damage when mounted, and ease of waterproofing. Additionally, shapes and patterns of gauges may now be produced which were formerly impossible.

CORRESPONDENCE

The Editor of "Flight" does not hold himself responsible for the views expressed by correspondents in these columns; the names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

Supersonic Bangs

THE problems and dangers of transonic and supersonic flight have attracted great interest for a number of years, and this interest has been heightened recently by the spectacular "sonic bang" effect which has been heard at the S.B.A.C. Display and elsewhere. Various explanations of this bang are current, and generally it is assumed to be produced at the instant the aircraft attains sonic speed.

Is it not more likely that the bang is associated with the shock-wave system which must be set up ahead of the aircraft at supersonic speed? The directional nature of the effect follows from the fact that the shock-wave is most intense directly ahead of the aircraft where the wave-front is normal to the direction of flight. If, having set up the wave-front, the aircraft decelerates, the shock-wave will be propagated ahead of it in exactly the same way as the pressure-wave from an explosion and will, if sufficiently intense, sound like an explosion.

One can only express the greatest sympathy with the victims of the recent tragic accident.

London, S.W.8. D. M. DAVIS.

HAVING regard to the many and varied Press reports and statements concerning the third "bang" heard at Farnborough on the Saturday, following the piercing of the "sound barrier" by the D.H. 110, this personal observation may be of interest.

I was scanning the sky overhead when I noticed the start of a "vapour" train in a patch of blue. Immediately examining it through the binoculars, I saw the plane at the head of the short straight trail, and after a moment it turned and dived towards me, presenting a little more than a head-on view. Suddenly the plane's image seemed to flutter, and vapour rings formed rapidly round its outline, exactly like the waves formed by a stone dropped in smooth water. The density immediately increased till it appeared like a small white vapour ball.

The view of the plane was now quite clear and the phenomenon was repeated, now so quickly that the two balls of vapour appeared to be joined together. The plane was clear again, travelling away from the vapour against a blue background, when it happened again after a slightly longer interval. After a moment or two more I dispensed with the binoculars, and saw that the first two balls of vapour appeared to be merged into one, and two small white irregular clouds could be seen, one larger than the other. We then heard the "bang, bang—bang" at the same intervals as the visual "explosions." My recollections of the phenomena are quite clear.

Monkseaton, Northumberland. FRANK JENNER.

I AM not at all happy about this ready acceptance of the sound-barrier business. The speed of sound has been exceeded many thousands of times, but no one thought about the sound barrier till recently. Why just one or two bangs? Is there any reasonable and lucid explanation?

I am of the opinion that a machine collects or raises a barrier of air pressure in front of it, and when it reaches a certain pressure the barrier suddenly breaks down and commences the same procedure over and over again so long as the aircraft travels fast enough.

Reading, Berks. MCKINLAY HARGREAVES.

Oracles at Farnborough

I FEEL that the following conversation, conducted in all seriousness and overheard at Farnborough on *Technicians'* Day, might be amusing to some in the industry. Two males, standing near the Bristol 173:

"What's this?"

"Oh, a helicopter, y'know."

"But there's nothin' inside it!"

"No, they leave 'em like that in case of war!"

How on earth do people like these obtain technicians' tickets? It is very difficult, in some companies, for technical staff to obtain them, and it appears that some distributors regard the occasion as a mere social gathering, giving the tickets in many instances to those whose talent lies in beer-tent performance and not in the technical field. Could not the S.B.A.C. exercise a closer watch on future distribution?

East Cowes, I.o.W. A. RATTLE.

A Reserve of Amateur Pilots?

MIGHT I suggest that the candidates for *ab initio* training (leading article, *Flight*, June 20th) could include young women? Many young men very interested in things aeronautical are not keen to fly, but a surprising number of girls would jump at the chance; perhaps the mechanical mind of the male is conscious of what can go wrong in the air; also, the recent publicity given to jet crashes makes many mothers exhort their sons to keep their feet on the ground. Women did a great job in the A.T.A. during the war and could do so again if another broke out.

Your suggested scheme does need consideration, as many men might be trained to fly after completion of their National Service. Humans are individuals and many mature late; at eighteen they are too unstable to make good pilots, whereas in two or three years they have settled down, and fulfil the promise an over-exuberant youth often portends. Here, perhaps, the part-time training now necessary after completion of the two years' continuous National Service could be used for the flying training you advocate, for few could find time for both, especially as many have also part-time technical training, and study for examinations, to occupy their "leisure" hours.

Cambridge. PEDANTICA.

[Our suggestion was that a comprehensive survey be made of the country's present "non-professional" pilot-strength; then all who wished could be encouraged to join an "Air Home Guard," equipped with light aircraft that could undertake communication and similar duties in this country in time of war.—ED.]

Allies from Poland

IN 1939 Germany, using overwhelming air and Panzer forces, invaded and conquered the territory of the Republic of Poland; yet she was unable to defeat the undaunted spirit of the Polish people, as not more than three months later the first Polish airmen arrived in this country.

We are commemorating this week [September 15th-21st] the 12th anniversary of the Battle of Britain, in which Polish airmen played their part. Their victories in the air during this battle amounted to over 200 enemy aircraft shot down. In the hour of deadly struggle for our existence as a free people they were our only allies, apart from the Commonwealth airmen.

Although in the course of events the Polish Air Force has been disbanded, there is in this country an organization which represents all those ex-airmen who during the last war were serving in the Polish Air Force under British command. This Association, registered under the War Charities Act, 1940, looks after their needs and welfare. There are a number of Polish ex-airmen who, because of war injuries or age, cannot earn a proper living. They, together with the widows and orphans of Polish airmen killed in the war, are being helped by this Association. The Association is doing great work, but it is seriously handicapped in its efforts by lack of funds. I am convinced that we owe these Polish airmen a debt of gratitude, just as we do to our own airmen.

I therefore appeal to you, and through your weekly to the entire aviation public, for support for the Polish Air Force Association to enable them to continue their good work.

Donations, however small, will be deeply appreciated. Cheques should be made out to the Polish Air Force Association, and all communications addressed to me at 14 Collingham Gardens, London, S.W.5.

ROM LANDAU.

FORTHCOMING EVENTS

Sept.	20.	R.A.F. At Home Day.
Sept.	20.	British Interplanetary Society: Report by British Delegation on Stuttgart Congress.
Sept.	20.	Derby Aero Club and R.A.F.V.R.: "At Home."
Sept.	21.	S.M.A.E.: Models Contests, Butlin's Holiday Camps.
Sept.	24-25.	Aerodrome Owners' Association: Annual Conference, London.
Sept.	28.	Aéro-Club de France: Coupe Stemm Helicopter Competition.
Oct.	3.	Helicopter Association: Brains Trust (Question Master, N. E. Rowe, C.B.E., F.R.Ae.S.).
Oct.	15.	Aircraft Recognition Society: Second 1952-3 Meeting and Contests.
Nov.	7.	Helicopter Association: "Operational Future of the Helicopter," by P. G. Masefield, M.A.(Eng.), F.R.Ae.S.
Nov.	8.	British Interplanetary Society: "Evolution of Life in the Universe," by Prof. J. D. Bernal, F.R.S.
Dec.	13.	British Interplanetary Society: "Guidance and Control of Missiles," by J. Humphries, B.Sc.(Eng.), A.M.I.Mech.E., A.F.R.Ae.S.

STATIC SHOW in RETROSPECT

Further Notes on Items of Technical Interest Exhibited at Farnborough

THIS and the following three pages are devoted to a review of selected new items seen at the recent S.B.A.C. Exhibition at Farnborough. Attention has been centred mainly on products which display noteworthy features not described in detail in our "Britain's Aircraft Industry" issue of August 29th.

Airscrews.—Without doubt the Britannia airscrew displayed by de Havilland Propellers, Ltd., is at the present time unique in this country. De Havilland consider the hollow-steel blade to be mandatory for large turbine airscrews and the 16ft-diameter four-blade unit which they exhibited represents the outcome of a very extensive programme of research. It is the first British production hollow-steel-blade airscrew and is also the largest single-rotation unit. The Princess at present has duralumin blades, but up-rated Proteus engines will require eventual substitution of units with hollow-steel blades.

The Rotol airscrew for the Viscount is a very efficient unit with solid duralumin blades and internal electric de-icing elements within the blade leading-edges and the spinner. This airscrew is hydraulically operated and the reversing pattern has a pitch-range of 110 deg.

Fairey have developed an excellent fixed-pitched metal airscrew for light aircraft which is both more efficient and more compact than previous patterns; it was seen at Farnborough on the Blackburn stand, fitted to a Bombardier.

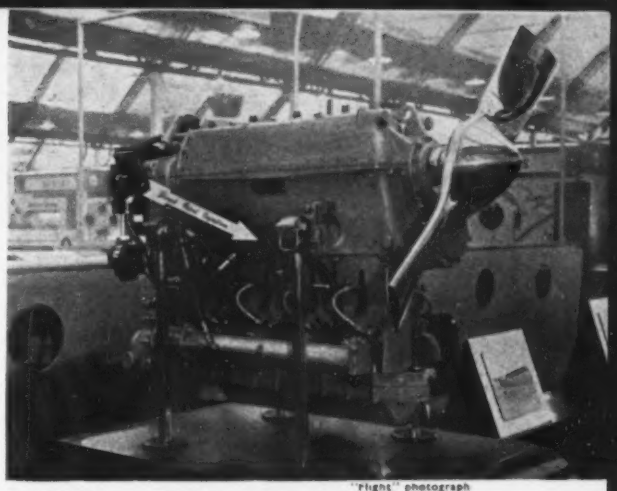
The Airscrew Co. and Jicwood, Ltd., have further developed the manufacture of many types of airscrew—fan, windmill, tunnel, ventilation equipment—and, through the Jicwood side, stressed insulating sandwich materials.

Cabin Air-Conditioning.—The three standard "Dragonfly" heaters from D. A. Daniel and Co., Ltd., represent a great improvement over previous such equipment and are undoubtedly among the most efficient to be found anywhere in the world. Much research has been directed to increasing output per unit volume and over 100,000 B.Th.U./hr can now be extracted from a unit of the same dimensions as the earlier Dragonfly 50 Mk. VI of but 62,500 B.Th.U./hr. The new Dragonfly units weigh just over 20lb per therm and can be supplied with a high-energy unit for ignition at high altitudes.

Among much other equipment on the stand of Sir George Godfrey and Partners, Ltd., were examples of two cold-air units: a brake turbine type and a turbo-compressor type. The former is driven by the main cabin pressure air and the turbine energy is dissipated in an external air circuit; the latter is similarly fed by the main cabin air, but is regenerative, all heat extracted being returned upstream of a secondary heat-exchanger. Normalair exhibited the D.1 oxygen regulator with its self-contained control system which provides oxygen automatically upon demand. Other new items included the company's universal non-return valve—which can operate in either direction, or alternatively, can be centralized for flow in both directions—and an automatic flow controller for cold-air units. Teddington Controls displayed a new 4-way mixing air valve with operating conditions of 75 lb/sq in and 350 deg C, together with other hot air valves and a flood-flow control attachment to guard against loss of pressure. Teddington also displayed an electronic cabin temperature controller which is used in the Britannia in conjunction with a sensitive relay system.

De-icing.—In addition to many conventional drum-type oil coolers, Delaney Gallay exhibited the heat-exchanger which they have developed for the Viscount. It transfers heat from the main turboprop exhaust to a fresh airflow which is then ducted along the wing leading-edge. The unit is manufactured from light alloy, only 10 per cent by weight being of stainless steel. The weight has thereby been kept to 44 lb, although the heat exchange rate can approximate to 300 h.p. Teddington Controls showed cyclic de-icing time switches, a typical example being that fitted to the Britannia for tailplane de-icing, which carries 20 amp at 208 V, 3-phase, 400 cyc/sec.

Joseph Lucas (Gas Turbine Equipment), Ltd., have recently developed a kerosine-burning combustion heater, which features a double wall through which passes the heated secondary airflow. When this heater is shut down, two air valves close automatically; this is not only a safety device for, should one heater of a number fail, these valves ensure that the output from the remainder is not diluted.



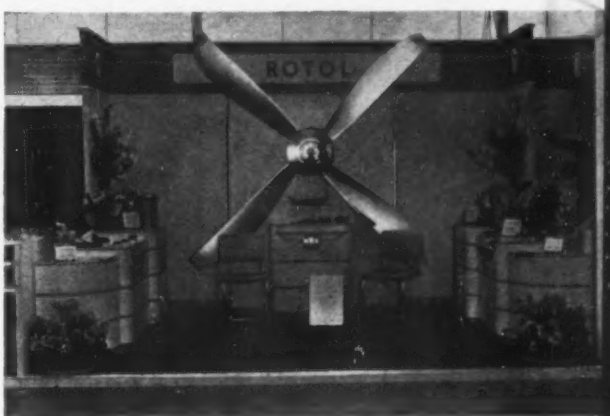
"Flight" photograph

The Blackburn Cirrus Bombardier, which was shown equipped with the new Fairey metal airscrew, in cropped form for display.

Electrics.—Perhaps the most important developments made by Rotax, Ltd., lie in the field of A.C. power systems. As an indication of the power now required, the company have developed single alternators with a rating of 73 kVA, supplying 3-phase, 400-cycle current at 208 V which is then rectified and transformed to 112 V D.C. Rotax displayed, in addition, switchgear and voltage- and frequency-control panels.

Westinghouse are famed for their rectifiers, and a new unit is a mobile transbooster rectifier which provides 28 V ± 1 per cent up to 200 amp. Correction of output voltage follows within one half-second of the load change. A further feature of this unit is its ability to provide up to 2,000 amp for turbine starting, when the D.C. voltage is allowed to fall below 10 V, so avoiding strain on the aircraft starter motors. Mention should also be made of a new airborne blast-cooled rectifier in which weight has been reduced; elements are more closely spaced so reducing size and air consumption; and protection has been improved by the use of edge-taped elements and superior paint.

A great range of Dowty electrical equipment included the new "Dowmic" sequence micro-switch, an exceptionally robust and weatherproofed unit well suited to rough treatment. A feature of its design is an increase of contact pressure up to the moment of "break", so permitting a "creeping" type of actuation without fear of arcing. On the stand of B. I. Callender's Cables, Ltd., were specimens of Glasil and Glasef P.T.F.E. cables, in addition to the better-known Pren patterns. P.T.F.E. wires were also displayed with operating temperature limits of − 75 to + 250 deg C. Two adjacent stands were taken by the Venner companies in order to provide a representative show of lightweight silver-zinc



The Rotol stand was dominated by a Viscount airscrew; accessory gearboxes are visible on the right. "Flight" photograph

STATIC SHOW IN RETROSPECT . . .

accumulators. A heavy-duty Silvercel was exhibited with a rating of 40 amp-hr; a special feature of this accumulator is its ability to discharge continuously at 300 to 500 amps, while no less than 1,500 amps can be obtained for limited periods.

Fire Prevention.—An unusual new item from Pyrene is a visual smoke-indicator. Considered complementary to their established detector units, this unit contains a number of illuminated panels past which air is drawn from the source of a remote fire upon receipt of a signal from a smoke detector unit. As low as 5 per cent obscuration by smoke is claimed to result in a clear signal from the diffused light.

Graviner showed several new items, including a new range of fire-extinguishing installations for power-plant protection. These are high-pressure units with full interchangeability and automatic operation.

Fuel Components.—The Joseph Lucas (Gas Turbine Equipment) exhibit was representative of the company's immensely wide range. Fuel pumps, in particular, are in demand with greatly increased capacity for such uses as on wet-boosted or afterburning turbo-jets. The D Mk II, for example, can deliver up to 1,400 gal/hr at 2,000 lb/sq in at 3,000 r.p.m., and an even higher delivery will obviously be available from a forthcoming Lucas fuel pump which combines two D IIs in one housing with a common centrifugal governor. New types of governor are under development to cater for wide-cut fuels at all altitudes.

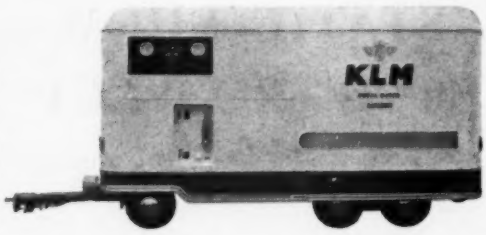
Flight Refuelling, Ltd., displayed probe-and-drogue equipment and certain of their many fuel valves. The FR float switch may be noted as typical of this company's simple designs; it is a double-acting unit and can thus close the circuit with either a rising or falling fuel level. Fuel-level variation of from 1 to 40in/min are provided for and the float is housed in an anti-surge box.

The Saunders Valve Co., Ltd., included a notable new series of their diaphragm gate-valves; the diaphragm seal is stated to render the valve leakproof in all normal operating positions and full bore is retained when open. These valves are available, manual or motorized, in sizes up to 4in bore. Amal, Ltd., flowmeters for test bench use include the Mk XII R, suitable for flows of up to 400 gal/hr. Four measuring tubes and scales are provided and a flow of as little as 32 pt/hr can be checked with accuracy.

Kent fuel meters include the MA4506 transmitter for high-pressure, high-capacity flows. This unit is intended for installation in the H.P. fuel line to each engine of a turbojet aircraft; no by-pass is fitted, piston-jamming merely causing an insignificant rise in pressure-drop. Various types of Kent receivers were shown, including instruments combining rate-of-flow with a totalising counter. Particularly suitable for use on small fuel-oil tank trucks with power take-off, Brodie-Kent positive-displacement meters employ twin calibrated pistons, without by-pass. These meters can be fitted with "Brodiomatic Quantrol," which not only includes a lockable housing for a continuous recorder, but may be pre-set to deliver a measured quantity of fuel.

Another fuel flowmeter seen at Farnborough was that developed by Negretti and Zambra. This good-looking unit measures flow through an orifice whose area is so controlled as to maintain a constant pressure difference across it.

Dowty fuel pumps are standard on many of the most important engines; type ENG 129 is typical of the higher-capacity, duplex models and is used on the Sapphire. This positive-displacement, multi-plunger unit is rated at a delivery of 1,500 gal/hr when working on kerosine against a pressure of 1,000 lb/sq in at 3,500 r.p.m., but greater r.p.m. and pressures are acceptable if required. These pumps do not need lubricant either in the pump or the fuel and incorporate a servo-operated overspeed by-pass valve. High-capacity fuel booster pumps were on the S.P.E. stand, the largest having an output of 2,000 gal/hr at 11 lb/sq in delivery pressure. Suitable, by their squat build, for installation in thin wings, these boosters can be attached anywhere on the bottom or side of a tank and include complete radio suppression.

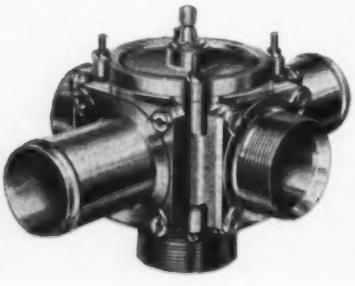


The M.L. Coolair Mk 2, a new mobile unit for airliners.

Hydraulics.—Possibly the biggest hydraulic system development from Dowty is the Vardel pump, shown this year for the first time. This comprises a low-pressure gear pump feeding a high-pressure multi-plunger pump with an unloading gear. The whole unit is very compact and weighs but 13½ lb. Pressures up to 4,000 lb/sq in are permissible with a delivery at 3,000 r.p.m. of 5 gal/min. Worth noting is the fact that the Vardel maintains full output without cavitation with an intake pressure equivalent to 60,000ft altitude. Fairey hydraulics have not previously been very well known, since their application has been largely restricted to Fairey aircraft. It is now the company's policy to make their hydraulic equipment generally available. Included are such diverse items as rotor-blade dampers, nosewheel steering units, Hydrobooster flying-control servos, and deck arrestor hook dampers. On the Exactor stand were examples of self-sealing pipe couplings whose applications include hydraulic systems, in addition to refuelling equipment, drop tanks, and circuits handling special chemicals. Exactor, of course, are also the makers of the "Type SL" hydraulic remote-control.

Instruments.—The enterprising Kelvin and Hughes/Smiths group joined four stands to display several new items. From the former partner appeared first details of a high-speed pitot/static head, which can be identified on several of the fastest British aircraft. The chief feature of this head is the extremely efficient heating system; details of the method adopted may not be published, but it may be said that the heat is concentrated around the nose intake and it is claimed that no icing can occur under any conditions. If the heater is left on in still air the insulation is not damaged. The tube has a length of 54in and operates on a generally normal "ram pressure and static slot" principle. Unfortunately we may not quote the type of Mach number with which this head can maintain accurate results. Smiths principal new development is the S.E.P.2 autopilot system. It is a three-axis, all-electric system, and is about 20 per cent lighter than the S.E.P.1 from which it is developed. It is designed to maintain flight at a preset barometric altitude, or to maintain ±15 deg climb or glide or up to 25 deg bank in a co-ordinated turn. The installation is designed for coupling with powered controls, ILS or other aids, or a gyro-magnetic compass system.

From Sperry appeared two new horizons and a Gyrosyn compass. The H.L.6 electric horizon is intended for fast military aircraft for which great accuracy during high-speed manœuvres or low-rate, high-altitude turns is essential. It is topple-free, and features quick erection and an almost complete absence of turning errors. The air-driven horizon H.L.8 is intended for trainers without A.C. supply. It has complete freedom in roll and ±80 deg in pitch. The Sperry C.L.3 compass has been introduced for aircraft which do not carry a navigator and have no spece for the earlier C.L.2 master unit. The C.L.3 incorporates the C.L.1a



Saunders spherical-plug, four-way cock as fitted to the Britannia.

Lucas upstream-injection gas-turbine burner.

gyro unit, amplifier and detector, but features a variation control box and a master unit which can be installed wherever convenient. Sperry claim that "the total weight will be considerably less than any comparable type of compass."

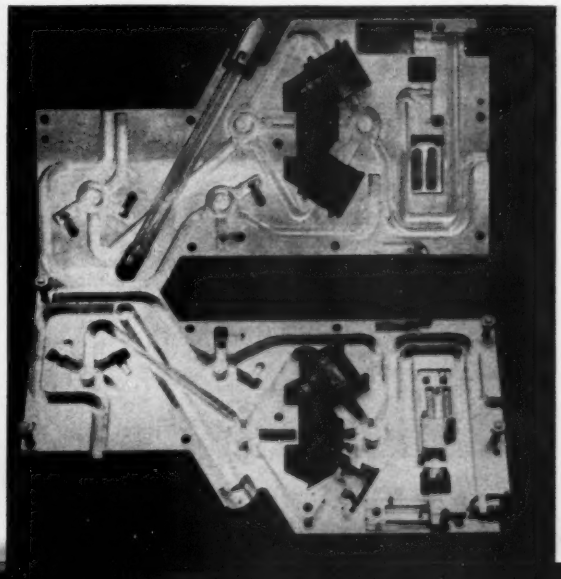
On the Negretti and Zambra stand was a fine display of capsules and stacks; this famous firm do not keep a standard range of such items but meet individual requirements. They also displayed various types of pressure gauge. Ferranti have developed an excellent gyro horizon with the designation F.H.5. This instrument employs an electrically-driven gyro in an hermetically sealed case; it has complete freedom in roll and up to 170 deg in pitch. Further features are boosted erection, absence of turn errors and very low wander. The weight is given as 6 lb 5 oz.

Salford Electrical Instruments' radio altimeter was shown to be above average in performance, the claimed accuracy being 3ft ± 3 per cent of the height reading, this being maintained down to below 50ft altitude. The equipment is based upon a cavity oscillator of 1,630 cyc/sec frequency, sawtooth-modulated over a 50-cyc/sec range. A double-superhet receiver then translates the difference between transmitted and received frequency into a pointer deflection, the dial being graduated into one revolution per thousand feet.

Pneumatics.—Dunlop's Mk I 3,000 lb/sq in compressor is available either as an airborne unit or as a ground compressor driven by an A.C. motor with integral gearbox. It is a three-stage two-shaft unit with an intercooling system; when pumping against a back-pressure of 3,300 lb/sq in the delivery is 2½ cu ft of free air per minute at 3,200 r.p.m.; ground level output is maintained up to 25,000ft. Hot air control was featured on the Hymatic stand, selected valves being shown on the "backcloth" inserted into air lines bled from the compressor of a Sapphire. About 250 deg C is the normal maximum operating temperature and relatively large flows are involved for such purposes as tank pressurization, fuel transfer and jettison, and recuperator pressure. Palmer displayed numerous selector and reducing valves in addition to operating jacks. Of the latter, large and small rams are exemplified by the C.25 (450 lb/sq in, stroke 10½in, weight 4¼ lb) and by the C.11 (350 lb/sq in, stroke 1in, weight 3¼ oz). Palmer Silvoflex hose is also now available in a fireproofed form to meet engine requirements.

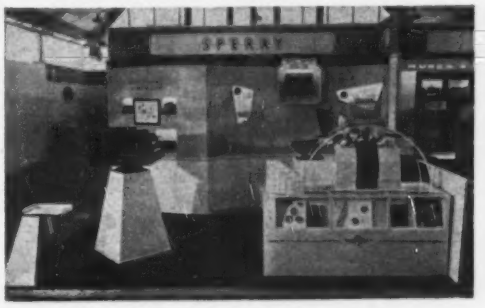
Starters and Other Engine Accessories.—Few details are yet forthcoming of the Plessey liquid-fuel turbine starter. It appears to be a most efficient unit and is claimed to weigh less than equivalent cartridge starters. Another evident advantage is that the number of starts obtainable without refilling is determined solely by the capacity of the fuel container, which need not be positioned adjacent to the starter motor. This neat development can, it is stated, bring any gas turbine to idling speed in 10 to 15 sec. A liquid-fuel starter has also been developed by Rotax. Although it has principally been produced for the larger engines, this new Rotax starter can be adapted for use with any turbine, since the endurance of operation can be controlled by a time-switch. High output torque is claimed and this starter also benefits from the possibility of very many starts without refilling. Rotax have also developed specialized sequence control units for these new starters. Yet a further Rotax unit deserving consideration is the latest high-energy ignition unit for starting and high-altitude re-lighting of engines. The delivery is 60 sparks per minute each with 12 joules stored energy at 21 V applied; the weight is 6 lb.

Mating halves of a Ferranti microwave circuit milled from solid.



"Flight" photographs

"Hot-air control" was the theme behind the Hymatic stand.



Gyroscopic flight instruments on the Sperry corner.

V.H.F. Omni-range equipment on show by Marconi.

V.O.R. and V.H.F. equipment on the Standard Radio stand, and Standard "SenTerCel" rectifiers and cables next door.

STATIC SHOW IN RETROSPECT . . .

The third company to develop a liquid-fuel starter is B.T.H., already well-known—like Plessey and Rotax—for solid-fuel cartridge starters. All these new motors employ a fuel such as iso-propyl nitrate, which can readily dissociate in a manner similar to a "cold" rocket fuel. The high-pressure exhaust gases are expanded through a turbine—a minute unit, running at some 45,000 to 65,000 r.p.m.—which is then geared down to the output shaft in a ratio of about 5 : 1. Fuel tankage required is unlikely to exceed about two gallons in most aircraft; all three of these new starters can effect at least three, and probably four, starts with such a supply. Starting times are generally less than with solid-fuel turbine starters, although the dissociation chamber has to be heated before reaction can occur.

On view on the K.L.G. stand were representative types of thermocouple, igniter plug, an H.T. igniter, type H18/1, and complete harness for the Dart. Thos. Boorn and Co., Ltd. exhibited Flylite hose and Flylink pipe elbows and connectors. Automotive Products' well-known Lockheed-Avery hose were displayed alongside filters for fuel, oil, and laboratory systems. Experimental flame tubes were shown by Samuel Fox (the steelmakers) and Amal had amassed a great array of flame traps.

Rotol gearboxes on view included those for the Viscount, Swift, and other new aircraft, in one of which the alternator is so large that it is mounted direct to the airframe and the gearbox and drive attached to the alternator.

Radio and Radar and Other Navigational Aids.—Cossor airfield radar is assured of a place on many airfields where the most comprehensive radar coverage is not justified. The Cossor installation consists of a rotating aerial—a parabolic reflector some 12ft long—a main rack weighing 400 lb and an indicator unit, usually paired, which provides a PPI display of variable radius up to 20 miles from the airfield. The display can be offset by an amount equal to the tube radius and the scanner may be elevated or depressed as desired. The system can, in conjunction with V.H.F. R/T and V.H.F. D/F., provide an efficient and flexible form of airfield control, talk-down, and surface surveillance. A long-felt need has been met by the introduction of a monitor receiver for M.F. beacons by International Aeradio. It consists essentially of a sensitive and stable superhet receiver with additional relay circuits to give immediate warning of incorrect operation of a beacon. The unit occupies but 3½in depth on a standard 19in rack. Ultra communication control equipment for large and small aircraft was on view, the object being to allow any member of an aircrew to select any facility desired. The larger type of station box included in the equipment has provision for nine receiving and four transmitting channels. Much of interest was to be found on the McMichael stand, including the first airborne electronic torquemeter we have seen commercially available in this country.

The Pye group now includes Unicam Instruments, Cathedron, Magnetic Devices, Labgear and the parent company. Each partner contributed to the Pye stand equipment of particular interest to research workers. Mention should be made here of the Pye-Ericsson multichannel V.H.F. R/T. equipment which was so effective in the recent International Gliding Championships.

Murphy D.M.E. equipment, selected by B.O.A.C. for the Comet and Britannia, is under continuous development. Ranges over 100 miles are already being obtained and 200 is the present target; such performance would clearly benefit Comet let-down accuracy. The new Murphy equipment is half the size and weight of the original wartime Rebecca.

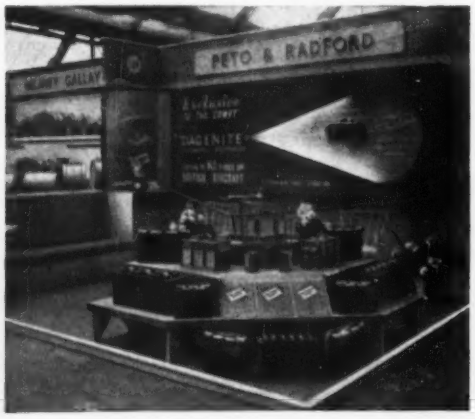
Ekco radar developments are chiefly in the spheres of approach aids and airborne search equipment. The simple pencil-beam approach radar, with a 12-mile range, is fairly well known. Less familiar are the Ekco search units, which equipment is the 3 cm band. Two main types of equipment are available : type E31 and 38 and type E31B and 38B. The latter are for aircraft with restricted nose space and the scanners of these systems are mounted separate from the associated equipment. On the E31 series the scanner sweeps over 150 deg once per second and tilt limits are ±10 deg. All equipment is designed to operate at more than 40,000ft. Burndept were displaying their 10-watt transmitter now in production and other new Burndept equipment included a dinghy radio and a 15-watt airport control transmitter. Standard Telephones VOR has now been fully developed and will soon be in production. It provides 100 channels in the 108–118 m/cs band. On the Marconi stand the visitor could also see VOR and, in fact, could try it out for himself. Marconi showed a cutaway VOR station model showing the aerial system, counterpoise, and transmitter layout. A completely new development by Ferranti, which has long been the subject of tentative experiments by several firms, is the production of milled-block microwave circuits. The primary reason for the development of such equipment is the impossibility of bending a waveguide to a small radius without introducing distortion. The Ferranti circuit is milled from solid block and is formed in two halves which mate with extreme accuracy. Additional guideways may be milled in the block to accommodate T.R. cells, crystals, or similar units. The whole circuit can, because of the sharp bends possible, be very compact, saving much space and weight. Ferranti have found that production time, also, is cut to about one-third of the original figure for tubular circuits.

Undercarriages.—Dominating the Dowty stand was the towering main gear developed for the Avro 698. A scooter-type principle has here been adopted, the bogie beam being hinged at the front axle. Eight wheels are used, which appear to be the accepted optimum for the largest aircraft. The main shock-absorber is a surprisingly small Liquid Spring cylinder.

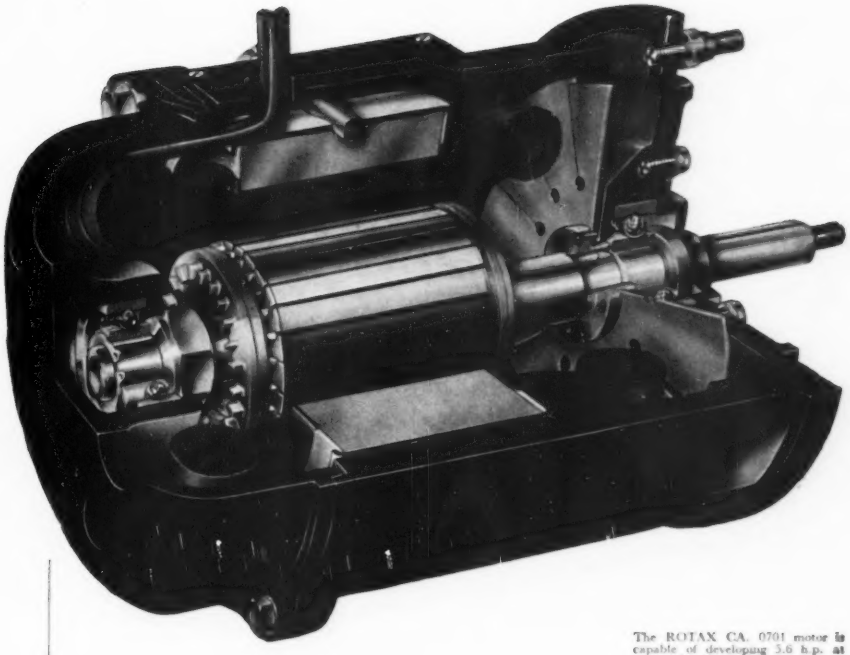
A rather similar unit was displayed by Electro-Hydraulics. The company cannot state its application, but the complete aircraft installation with nose undercarriage weighs but 3 per cent of the aircraft all-up weight, an excellent figure. The main leg is hinged about 9ft from the ground. The bogie turns about the lower end of the main leg to lie flat when retracted. A similar method of retraction is followed by the Messier main units for the Britannia; this undercarriage, with nose unit, has a specific weight of 3.46 per cent, equivalent to about 4,850 lb. These three new bogie units, together with the de Havilland Comet bogie, were illustrated in our last issue. Bigger wheels are used on the Valiant, for this equally heavy aircraft has but four mainwheels on independent legs. An example of this wheel, complete with the attached disc-brake assembly, was exhibited by Goodyear.

Brake development is necessarily proceeding apace, and new designs were shown by Girling (single- and two-leading-shoe units), Palmer (extra-heavy-duty disc type for fighters), and Dunlop (Canberra wheel with plate brake and an example of the Maxaret installation). The other British anti-skid device, the Decelostat, is under development; it was shown in its latest form on the Westinghouse stand.

Peto and Radford are especially proud of their lightweight battery used on the Comet. Delaney Gallay products are glimpsed beyond.



Particularly pleasing was the arrangement of castings, forgings, extrusions and blading by High Duty Alloys.



The ROTAX CA. 0701 motor is capable of developing 5.6 h.p. at ground level.

• AN AUXILIARY MOTOR *for the Handley Page HERMES 4*

Rotax have in the past developed a range of 400 cycle motors, but the motor illustrated above is designed to operate over a lower frequency range of 240-280 cycles to meet the special requirements of the Hermes 4 generating system. The motor's application is controlled by a Rotax Frequency Sensitive Unit.

These motors operating from a 3-phase, 110 volt supply have the double advantage of saving cable weight and of providing the robust construction associated with induction motors.

At all times, our engineers are available to advise on the application of electric motors in aircraft.

Complete Electrical Systems for Aircraft

ROTAX

ROTAX LIMITED, WILLESDEN JUNCTION, LONDON, N.W.10, ENGLAND
LUCAS-ROTAX LTD., SCARBOROUGH, ONTARIO, CANADA
LUCAS-ROTAX (AUSTRALIA) PTY. LTD., 18 BOUVERIE STREET, MELBOURNE, N.3, AUSTRALIA

a tight turn....

The skier's ability to make a tight turn on a fast down hill run may mean the difference between a race won or lost, or even life and death.... Tight turns at the high speeds required of modern aircraft, impose stresses upon them which can only be endured if the design and quality of their component parts is of the highest. The ultra light magnesium alloy components made by Essex Aero Ltd fully meet these requirements.

magnesium alloy

ultra light components

ESSEX AERO LIMITED THE AIRPORT GRAVESEND KENT TELEPHONE GRAVESEND 4261 (6 LINES)

CIVIL AVIATION

OCEAN-HOPPER: A big moment for Qantas Empire Airways was the arrival at Johannesburg (right) of the Constellation which inaugurated their fortnightly Kangaroo service across the Indian Ocean, via the Cocos Islands. Commanded by Capt. K. G. Jackson, Q.E.A.'s senior pilot, the aircraft completed its round trip on September 10th, when it landed at Sydney.

MORE VISCOUNTS FOR AUSTRALIA?

ACCORDING to a report from Sydney, the Australian Government has decided to spend £5.5m on Vickers Viscount turbo-prop airliners for the State-owned Australian National Airways. Manufacturers are seldom able to announce an order until the actual contract has been signed, and, as expected, Vickers-Armstrongs, Ltd., have declined to comment on the report. That A.N.A. should decide to re-equip with Viscounts is, however, not unlikely; it will be recalled that an order for six Viscounts was placed last May by Trans Australia Airlines, a privately owned concern in competition with A.N.A. The value of this order was stated to be approximately £1.5m, indicating that the reported A.N.A. order would be for not less than 22 aircraft. To date, orders for 48 Viscounts have been placed by four different airlines.

I.A.T.A. CONFERENCE OPENS

THE prediction that in 1952 the airlines will do 250 per cent more revenue flying than they did five years ago was made by Sir William P. Hildred, director-general of the International Air Transport Association, at Geneva on September 15th. The occasion was the opening of the five-day annual general meeting of I.A.T.A., and Sir William's forecast was made in the course of his report to the delegates of the 67 member airlines. He said that by the end of December their 2,500 aircraft would have carried 45m passengers during the year, and cargo operations would have passed the 1,000m tonne-kilometre mark for the first time; he estimated that airline revenues for 1952 would total "something less than 2,000m dollars." Phenomenal results had been achieved during the first few months of tourist travel over the North Atlantic route (traffic had increased by 50 per cent for an increase of only 10 per cent in the number of services) and this augured well for their prosperity inside Europe, where they would become effective next May.

Addressing the conference, Sir Miles Thomas, chairman of B.O.A.C., said that the past year would go down in history for two important developments in civil aviation—the application of jet propulsion and the lowering of fares. Speaking of the future, he declared that B.O.A.C. were studying with great care the prospect of adopting delta-wing aircraft.

Last week, it will be remembered, the Hawker Siddeley Group made the first announcement of a projected 107-passenger version of the Avro 698 delta bomber. Earlier, unconfirmed reports from Geneva had attributed to Sir Miles the prophecy that by 1960 B.O.A.C. would be operating a 120-passenger jet airliner. This machine, it was stated, would be capable of flying at near-sonic speed for 5,000 miles; its range would be sufficient for it to fly from London to Tokyo by the Northern route with not more than one stop.

For the past year Sir Miles has been the chairman of I.A.T.A. This office was taken over last Monday by Dr. Walter Berchtold, president of Swissair, which is celebrating its 21st anniversary of scheduled operations. Precedings at this world airline conference will be reported at length in the next issue of *Flight*.

CHARTER NOTES

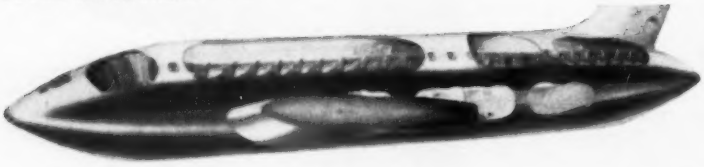
DURING the week ended September 14th, the British independent operators completed 15 per cent less business than the average for the past three weeks. Apart from trooping flights, the number of trips completed was reported as 85, amounting to 68,000 miles flown. The drop in business was due to the cessation of summer tourist flights and, even so, is offset slightly by a particularly good week on the part of one operator. Of the total mileage, some 43,000 were flown on freight flights and the remaining 25,000 on passenger charters. Freight tonnage, at 420 tons, was about 70 tons higher than the recent average, but the number of passengers carried (500) represented a drop of about 50 per cent. Most of the week's business consisted of short-range flights by Bristol 170s and Dakotas; there were a few longer flights by Yorks and Dakotas, but 32 per cent of the mileage was flown on the Hamburg-Berlin freight ferry. The week's flying time amounted to 420 hours and the probable resulting revenue was £29,000.

Skyways, Eagle and Crewsair were occupied mainly with trooping (which will be fully reviewed in a later issue of *Flight*). However, one of Eagle's Yorks flew to Livingstone with 50 emigrant railway workers, and Skyways undertook a commercial flight with a York when they flew 46 leave personnel back to Nicosia, Cyprus. Trading under the "domestic" name of Lancashire Aircraft Corporation, Skyways also completed a number of short passenger charters within the U.K. Other York flights included 35 round trips between Hamburg and Berlin by Air Charter; this company also undertook a sizeable amount of passenger work under sub-charter to B.E.A., but details of this are not available.

Silver City's Bristol 170s, also on the Berlin lift, had their

BEFORE AND AFTER: (Left) At a ceremony marking the departure of the first Indian Ocean service, Capt. J. J. Connally, the pilot, was presented with a token bag of mail by Mr. Vantoff, a postal executive. Seen after the arrival at Johannesburg (right) are Mr. Hudson Fysh, Qantas chairman; Lt.-Col. Hodgson, Australian High Commissioner; Mr. Hubert Anthony, Australian Minister of Civil Aviation; Mrs. Sauer, wife of the South African Minister of Transport; and Mrs. Anthony.

CIVIL AVIATION . . .



RADLETT ROCKET: Absence of wings and tail gave a "rocket-ship" appearance to the model of the H.P.97 shown at Farnborough, where it dominated the Handley Page stand in the static exhibition. Powered by four Sapphires, the H.P.97 will carry 96 passengers in a first-class version (as shown by the model) or 150 in higher-density form.

busiest week for a very long time, completing 25 round trips. Two of them flew out to Berlin and returned with 17,000 lb of stage props, two more flew similar loads from Berlin to Vienna, and two further flights carried television and aviation exhibits for the Berlin Trade Fair. In two return flights, eight racehorses were flown to and from Le Bourget and Doncaster, and a single horse was taken from Lympne to Paris. Early in the week two Bristols went to Gibraltar and returned with 72 seamen and a few days later a single Bristol brought three Connaught racing cars back to Lympne from Milan. Over the week-end 10 tons of cheese were flown in two flights from Le Touquet to Lympne.

A B.K.S. Dakota, returning from Johannesburg, brought back a load of freight which was being carried by a crashed Phoenix Airlines aircraft. One of Scottish Airlines' Dakotas was chartered by six American tourists, who wished to fly from Inverness to London, while another Dakota of the same company flew supplies of oil-drilling equipment to Dukhan for the Iraq Petroleum Co. Fairey Aviation's Dakota took a party of 24 passengers to Doncaster for the St. Leger, and Air Transport (Charter) (C.I.) flew 32 people each way between Blackbushe and Salzburg.

AIR TRANSPORT AND THE EMPIRE

TO mark the occasion of the Colonial Civil Aviation Conference in London, a luncheon was given by the Air League of the British Empire at the Mansion House on September 11th. Sir Leslie Boyce, Lord Mayor of London, was in the chair, and some 250 guests were invited.

The toast of the Lord Mayor and Corporation was briefly and admirably proposed by the Air League's chairman, Air Chief Marshal Sir Guy Garrod. In particular, he thanked Sir Leslie Boyce for doing so much to focus public interest upon the efforts of the Air League. The Lord Mayor replied in what was accurately described later as a thoroughly enjoyable and robust manner.

The Secretary of State for the Colonies, the Right Honourable Oliver Lyttelton, spoke of the effect of air travel upon colonial relationships and administration, and said that aircraft were the most important single material thing in the Empire today. He said that most of the machines used on local and regional transportation in the colonies today were obsolescent or obsolete. He wished to see these local services operated by new British aircraft. The conditions in such areas differed widely from those on the trunk routes, but were similar to one another. He appealed to the British air industry to provide suitable aircraft.

The final speech was made by Viscount Bruce of Melbourne, who paid a warm tribute to the work of the Air League, whose fundamental job was to make the people air-minded, but which was also trying to make the Government aware of the priorities which should be given to air matters. He referred to the problems resulting from the rapidly increasing world population and mentioned briefly the contribution which aircraft could make to the prevention of food shortages. He stressed that the helicopter should not be forgotten.

BREVITIES

AER LINGUS carried over 55,000 people in August, which was the busiest month in the company's history. Services between Dublin and London alone carried over 20,500 passengers, 4,600 of them on off-peak "Starflights." Compared with results for the corresponding month last year, the 13 routes of Aer Lingus carried 20 per cent more passengers and the total freight traffic also went up—by 25 per cent.

* * *

B.O.A.C.'s cut-fare services on the North Atlantic route carried over 12,800 passengers between May 1st, when they were inaugurated, and August 31st. Nearly 8,600 people flew on the Mayflower routes between London, Glasgow and the U.S.A., and the Beaver flights between the U.K. and Montreal carried 4,280. All B.O.A.C.'s services are operated by 68-seat Constellations.

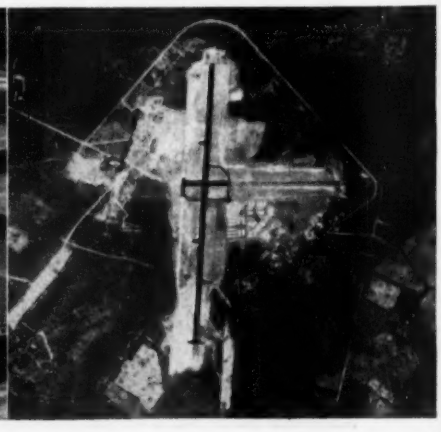
* * *

The domestic services of Trans World Airlines flew 178.6 million passenger miles in August, surpassing the previous record of 175 million, which was attained last June. T.W.A.'s passenger mileage on international routes during August totalled 51.6 million compared with 47.7 million in July, which had been the best figure for any month of operations.

* * *

Bookings on flights operated by American Air Lines are now being made through an automatic central register with the impressive name of "Magnetronic Reservisor." At the push of a button an agent can ascertain whether or not space is available on any selected flight or whether seats are available on another flight to the same destination. Another button is pressed and seats are

KENTUCKY AIRPORT, the new terminal for Salisbury, S. Rhodesia, is well advanced in construction, as these new pictures show. The main runway (right) is 2,800yd in length, and a secondary runway at right angles to it is being built. Some Comet services may later be routed through Kentucky.



COLONIALS: Pictured at Nairobi West, these two useful but ageing transports illustrate Mr. Oliver Littleton's remark, made during last week's Colonial Civil Aviation Conference, that most of the aircraft used on local and regional services in the colonies today are obsolete or obsolescent. (Left) An Anson used on charter operations from Nairobi; (right) an East African Airways Lodestar completing a scheduled service from Entebbe.

automatically reserved and withdrawn from the inventory of seats available. The equipment which comprises this mechanical brain includes 1,500 vacuum tubes, 1,400 relays, 44 miles of wire, 1,500 yards of cable and 5 million soldered connections.

* * *

Since September 1st all surface wind directions given by M.C.A. approach and control units in the U.K. for take-off and landing purposes have been expressed in degrees magnetic. Announcing this, *M.C.A. Information Circular No.* 84 states that the word magnetic will be used in these circumstances for an indoctrination period of three months.

* * *

United Air Lines have placed a £1 million order with the Curtiss-Wright Corporation for four flight simulators—two for DC-6 crews and two for training crews for Convairliners. The first Curtiss-Wright simulator was designed to reproduce the flight characteristics of the Stratocruiser and has more than paid for itself in the last few years. It has been used by P.A.W.A. to train more than 250 crews—125 of their own, 85 for M.A.T.S. and 40 for B.O.A.C. Simulators for the Comet and Britannia are being developed in this country by Redifon.

* * *

Capt. Keith Virtue.

With over 21,000 flying hours to his credit, Captain Keith Virtue ranks as Australia's most experienced pilot. Over half his flying time has been logged in DC-3s, and 5,000 hr in DC-4s which, as senior pilot of Australian National Airways, he now flies on the company's domestic and overseas routes. Virtue, who is 43, obtained his commercial licence at the age of 19, and spent his early flying time as a joy-ride pilot. A nephew, Capt. J. Hassard, who has flown 19,500 hr, is also employed by A.N.A. Capt. Virtue looks forward to logging another 10,000 hr before retiring.

FROM THE CLUBS

ORGANIZED by Mr. Rodney Matthews-Naper, who has flown in a number of races this year, a rally is to be held at Dunmore East, County Waterford, on Sunday, September 28th. There will be competitions for spot-landings and distance flown to the rally, and there will also be a prize for the owner of the best-kept aircraft. Dunmore East Airfield is owned by Mr. Arthur Westcott-Pitt, who is always ready to welcome any private pilot arriving there (no landing or hangarage fees are charged); it is situated on the coast, south of Waterford. Pilots should arrive by the morning of Saturday, September 27th, having previously notified Mr. Matthews-Naper at Loughcrew, Old Castle, County Meath, so that accommodation can be arranged. The Shell organization will provide transport to Dunmore East for those pilots who fly in to Dublin Airport (Collinstown).

EXCLUDING flying time logged by private owners, 516 hr 50 min were flown by the Wiltshire Flying Club in August, bringing the 1952 total at the end of that month to just over 2,462 hr. Tomorrow (Saturday) the club celebrates its 21st birthday, and to mark the occasion is holding a rally, in conjunction with the Royal Artillery Aero Club. Private owners and members of other clubs should arrive between noon and 2.30 p.m. There will be an arrival competition, and aerobatic displays by an Aiglet and Olympia sailplane during the afternoon; tea will be provided for all visitors by air.

SOME figures published in the August 15th issue of *Flight* gave an idea of the impressive amount of flying done by the Wellington Aero Club of New Zealand, which has a fleet of ten aircraft. While this information was on its way to England, the Club was in the process of setting up a record number of hours logged in any one month—July—in which 462 hr 35 min were flown on club and Government-subsidized training. Commercial flights increased the club's total by some 70 hr.

BEARING the racing number 58, and entered in the Siddeley Challenge Trophy Race by the Derby Aero Club, the Hawk Trainer illustrated on page 323 of *Flight* for September 5th was flown by Mr. L. G. Cooper, and not by Mr. L. S. Loveridge, as stated. The latter pilot flew a similar aircraft (No. 57), which was entered by Wolverhampton Aero Club.

PROGRESS WITH THE SIPA 200

SINCE it was first shown in an incomplete form in the 1951 Salon de l'Aeronautique, the SIPA 200 jet propelled lightplane has been developed into a practical two seater for sporting or training duties, and a number of modifications have been made to the airframe.

The machine shown at Paris did not fly, and was used solely for static tests. A second machine was completed late in 1951 and flew from Villacoublay on January 14th, last. Several modifications were found to be necessary; these have now been embodied, and flight-testing has been resumed.

The twin booms have been strengthened and greatly increased in depth, and a hinge has been provided just aft of the wing trailing edge on each boom, so that the after portion, including the tail, folds forward over the cockpit, for storage and easy handling. Originally, the cockpit hood was in one piece, and hinged forwards. This arrangement was rather too flimsy, and a central strut has been incorporated, to which are attached two upwards opening doors. The shape of the rudders has been altered slightly, and mass balances have been fitted.

Of all-metal construction, the S.200 has a laminar flow wing, hydraulically retracted tricycle undercarriage, and is powered by a Turboméca Palas turbojet of 300 lb s.t. Double-slotted Fowler-type flaps and aerodynamically compensated slotted ailerons are employed. With these, the projected single-seat version of the aircraft will be cleared for aerobatics.

Data for the SIPA 200 are as follows (weight figures for the single-seat aerobatic version are in brackets): Span, 23ft 8in; length, 16ft 11in; height, 5ft 10in; wing area, 95 sq ft; dihedral, 3 deg; wing-loading, 16.28 lb/sq ft; empty weight, 810 lb; fuel and oil, 359 lb (180); crew, 376 lb (183); baggage and extras, 22 lb; all-up weight, 1,567 lb (1,173). (A projected liaison version would carry extra fuel and oil 530 lb, giving increased all-up weight of 1,716 lb.) Maximum sea-level speed, 267 m.p.h.; cruising at 3,28oft, 236 m.p.h.; rate of climb at sea level, 1,140ft/min; take-off run 1,150ft; maximum ceiling 26,247ft; range from 280 to 435 miles (according to speed and altitude); fuel consumption at economic cruising 22 gallons per hour. All the performance figures are estimated.

SHOREHAM SHORT-CIRCUIT

Throttle Benders on a Five-mile Lap

THE Southern Aero Club's informal meeting at Shoreham last Saturday was by way of being a try-out of short-circuit air racing, i.e., racing over a course entirely within the spectators' view. For the public, this sort of contest has everything to recommend it (though the ideal would be to have aircraft of fairly similar speed, so that all were on the same lap from start to finish); competitors do not have to bother about navigation; and only the safety-factor can be in question. The R.Ae.C. gave the experiment its blessing; Col. Preston, seemed favourably impressed.

The first of the two contests, however, was a conventional three-lap affair round a 15-mile, five-legged circuit. It drew 11 starters, ranging in celerity from a trio of Tiger Moths to Ron Paine's Hawk Speed Six.

Shoreham lies within a crescent of the South Downs, and at the start it was illuminating to watch the contrasting methods of take-off: some competitors favoured a straight climb to the first turn, on a hill-top a couple of miles to the N.E.; others preferred to hold down right across the airfield and then climb steeply up the hillside, thus gaining a lee from a 10-15 kt head-wind.

On the first lap the three Tigers (de Vere, Hayhow and Snook) were unmolested, followed by Alington (unfamiliarly mounted in the Fairey Junior, OO-ULA) and Farley's Autocar. Westbrook (Messenger IVa) realized he had cut the first turn, and retired. By round 2, with everybody now on the same lap, the stop-watch pundits were beginning to tip W/C. McIntosh's Proctor; but at the finish it was Paine who came streaking in, a mile or so ahead of Somers' Gemini, with McIntosh in third place.

The S.A.C.'s hon. secretary, Mr. M. Macdonald, had selected the course, and he also was responsible for the novel circuit over which five members of the Throttle Benders' Union now held a private contest. His choice was a five mile triangle, with a right-angle turn over the airfield and acute corners into and out of the far leg along the downland skyline.

On the line were Alington (Fairey Junior); Walter Bowles (Messenger IIa)—elected to the T.B.U. that very day; Dunkerley (Cirrus Gemini); Somers (Gipsy-Major Gemini); and Paine (Hawk Speed Six). Bowles was nearly a non-starter, his oil distribution having decided, during the previous race, to extend itself to the engine's exterior; but pressure remained reassuring.

The Fairy Junior had made its first lap, and was well away on the second, when Bowles was flagged off at 3 min 19 sec. Over 3 min after Bowles the two Geminis were sent off, and, although Somers was conceding 5 sec to Dunkerley, he made such a spectacular getaway that he drew level with his rival before they reached the airfield boundary. Paine left from scratch 66 sec later.

Except for the Gemini change-over the starting order was maintained until the sixth and last lap, when the Messenger could be identified on the distant leg with a rapidly coalescing quartet of aircraft not far behind. On the final dash Bowles held his lead,

Throttle-bender Bowles (with Mrs. Bowles) and (right) Ron Paine.

to win by 9 sec from the foursome—which, crossing line within a span of 3 sec, consisted of Somers (2nd), Paine (3rd) and Dunkerley (5th), with the little Fairey Junior sandwiched between them in 4th place. Bowles was only 0.5 m.p.h. slower than he had been in the long-circuit race; otherwise the result was quite a triumph for handicapper Philip Mayne.

The Geminis were, as usual, most spectacular on the turns. Somers told us that on the two acute angles his tactics were to go in as tightly as possible and then, as he began to feel himself "greying-out" under the influence of g, to open-out the radius.

As make-weight during the afternoon, there were aerobatics and demonstrations by the C.F.I., Cecil Pashley (Tiger Moth)—who was teaching people to fly on this same airfield in 1911!—Ian Forbes (Miles Aries), Derek Dempster (Chilton), Ken Fripp (Olympia sailplane, Southdown G.C.) and Geoffrey Alington (Fairey Junior). The weather was clear, though the sun veiled itself as the programme began and re-emerged as it ended; and there was a first-rate commentary by Mr. Graham Head.

SOUTHERN AERO CLUB RACE

Pl.	Pilot, Aircraft and Engines	H'cap. m. s.	Finis. time m. s.	Av. speed m.p.h.
1	R. R. Paine (Hawk Speed Six, G. Six If) ...	11 27	25 58	187
2	J. N. Somers (Gemini III, 2 G. Maj. Ic) ...	10 00	26 20	166
3	R. H. McIntosh (Proctor I, G. Queen II) ...	08 46	26 26	153.5
4	M. R. Chandler (Hawk Tr., G. Maj. I) ...	06 29	26 36	135
5	G. Farley (Autocar, G. Maj. I)	03 53	26 37	119.5
6	W. P. Bowles (Messenger IIa, Cir. Maj. III) ...	05 25	26 38	128
7	B. Snook (Tiger Moth, G. Maj. I)	00 16	27 18	100.5
8	T. W. Hayhow (Tiger Moth, G. Maj. I) ...	00 16	27 33	99.5
9	C. de Vere (Tiger Moth, G. Maj. I) ...	00 00	27 45	98
10	C. G. Alington (Fairey Junior, Mikron) ...	02 24	29 00	102

Winner receives Zoe Beadle Trophy; 2nd prize, Dunlop Cup.

THROTTLE BENDERS' INVITATION RACE

Pl.	Pilot, Aircraft and Engine	H'cap. m. s.	Finis. time m. s.	Av. speed m.p.h.
1	W. P. Bowles (Messenger IIa, Cir. Maj. III) ...	03 19	17 44	127.5
2	J. N. Somers (Gemini III, 2 G. Maj. Ic) ...	06 32	17 53	162
3	R. R. Paine (Hawk Speed Six, G. Six If) ...	07 38	17 54	179.5
4	C. G. Alington (Fairy Junior, Mikron) ...	00 00	17 55	102.5
5	F. Dunkerley (Gemini Ia, 2 Cir. Min. II) ...	06 27	17 56	160

STANSTED'S BIG DAY

THE Stansted, Essex, branch of the R.A.F. Association is now in its third year. Nearly all the members are employed at Stansted Airport and the branch is unusually small and compact. To attempt a full-scale air display—as this branch did last Saturday, September 13th, to commemorate the Battle of Britain—was a most courageous effort. The success achieved was partly due to the fine weather, but it also typifies the support which an enterprising group of enthusiasts can command in a good cause.

The Ministry of Civil Aviation, who run Stansted, co-operated wholeheartedly. So did the tenants—Skyways (Lancashire Aircraft Corporation) and Helliwell's in particular. Shell-Mex and B.P. gave much practical help, including the loan of a mobile cinema and public-address system.

R.A.F., R.Aux.A.F., and R.A.F.V.R. participation consisted of formation fly-pasts by Meteor 8s, 12 from No. 72 squadron and six from No. 601, all led by S/L. Harvey; S/L. Hubbard, the C.F.I. at 22 R.F.S. Cambridge, with his Chipmunk; F/L. Allen, D.F.C., from 231 O.C.U., Bassingbourn, who put up the finest Service Canberra show we have yet seen; and F/L. Gordon, that superb Meteor 7 demonstrator from Little Rissington, whose negative-g manœuvres are becoming famous.

From No. 1 Wing, R.C.A.F. at North Luffenham came a smoking sextet of Sabres—but they were less impressive than on former occasions, keeping high and rather too distant, and offering no aerobatics. The highlights of the day were provided by the U.S.A.F. Four F-84Gs, a Lockheed T-33A, and a Convair-Stinson L-5B does not appear an impressive assortment—but it was. The L-5 (Sentinel) was flown by one Patrick O'Leary, a Thunderjet pilot, who proceeded to carry out the most carefree series of low-altitude evolutions we wish to witness; there is plenty of power (213 h.p.) in this type, but one can ask too much. The T-33A dropped in and offered to do a show impromptu; with two Lombard-helmeted figures visible in the cockpit, the brilliantly coloured trainer effected the tightest high-speed turns and most violent rolls of the day.

Finally, the F-84s: they came from the 20th Fighter-Bomber Wing and, with the exception of the "bombshell" and "threading the needle" they went right through the old Skyblazer routine with superb élan and precision.

The display was rounded off with a cheerful fire-fighting set-piece. The whole occasion was very heartening; it showed the way for small organizations with big ideas. A crowd of 1,000 had been estimated sufficient to "break even"; over 3,000 were admitted. G/C. G. F. K. Donaldson gave "lucky-number" programme holders free rides in the Globe Swift; and to him and to Mr. Coen (the airport manager) and to Messrs. Searle and Heath, the R.A.F.A. Branch chairman and secretary, and to many others, the day's success was a reward for their enterprise.

A de Havilland Announcement

OPPORTUNITIES AT HATFIELD

Interesting Vacancies in the de Havilland Advanced-Project Teams

Scope and Security for Top-Grade Technicians

FAR-REACHING development plans have called for further considerable expansion of the de Havilland technical team.

Technicians who combine top-grade qualifications with a high degree of enthusiasm and vision are required immediately for key posts in work on advanced projects.

The de Havilland Aircraft Company is chiefly interested in people with first-class knowledge and experience, who can command a high salary and can make their own particular mark in aeronautical development. The appointments will be permanent, progressive and pensionable.

INTER-RELATED WORLD TEAMS : It is well known that one of the bases of continued success of de Havilland products is the close co-operation between teams of technicians and operating specialists working in different parts of the world. Thus the de Havilland technician has unrivalled opportunities to widen his own scope and outlook by acquiring at first hand knowledge of technical development and operating conditions throughout the world.

In this connection it is worth stressing that the de Havilland Enterprise is the only organisation of its kind which designs and constructs military and civil aircraft, guided weapons, jet, rocket and piston engines and propellers.

ADVANCED PROJECTS : With the world's first jet airliner, the Comet, now building up to full production and the first stages of the conquest of supersonic speed passed, the Company is entering upon a new phase in its programme of work on civil and military aircraft. A whole new field of aeronautical development is now open, and for technicians able to play an effective part in a team working on many aspects of advanced design, the opportunities for real achievement —as well as for progress and promotion— are high.

HOUSING : As everywhere else, obtaining unfurnished accommodation in this area is not easy, but the Company is prepared to help surmount this obstacle by giving assistance to suitable applicants. While no definite assurances can be given, of course, intending candidates are urged *not* to allow the housing problem to stand in the way of their initial application.

Designers (structural and mechanical), aerodynamicists and stress analysts interested in these vacancies are invited to write to :—

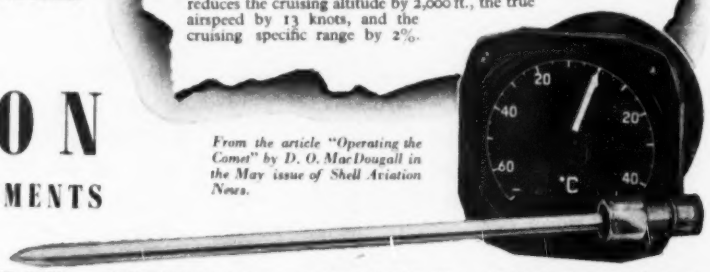
The Chief Designer,
THE DE HAVILLAND AIRCRAFT
COMPANY LIMITED,
HATFIELD, HERTS.

ACCURATE INDICATION OF AIR TEMPERATURE GOVERNS THE WHOLE ECONOMY OF OPERATION

Weston Thermometry has been chosen for several applications on the De Havilland 'Comet' including fuel temperature, cabin air temperature, wing and tail de-icing as well as outside air temperature.
Illustrated is the Model S.110G/9 Thermometer Bulb with its associated Indicator, the Model S.63 circular scale Ratiometer used for outside air temperatures.

Flight Planning The air temperature is one of the most important factors in the operation of a long-range jet aircraft as it influences the rate of climb, the heights at which the aircraft will cruise, and hence the true airspeed. The latter in turn determines the specific range (air miles per pound of fuel) since within limits, fuel consumption per hour at the normal cruising altitudes does not vary much. It can be seen therefore that air temperature controls the choice of flight path, largely determines the fuel load carried, and governs the whole economy of the operation. The effect of air temperature on Comet operations can be illustrated by the fact that a 10°C. rise in temperature reduces the cruising altitude by 2,000 ft., the true airspeed by 13 knots, and the cruising specific range by 2%.

From the article "Operating the Comet" by D. O. MacDougall in the May issue of Shell Aviation News.



WESTON
AIRCRAFT INSTRUMENTS

SANGAMO WESTON LIMITED ENFIELD MIDDLESEX
Tel: Enfield 3434 (6 lines) 1242 (4 lines) *Grams: Sanwest, Enfield.*
London Office: St. Georges Court, 22-26 New Oxford Street, London, W.C.1. CHA 4971. Scottish Factory: Port Glasgow, Renfrewshire.
Branches: Glasgow, Manchester, Newcastle-on-Tyne, Leeds, Liverpool, Wolverhampton, Nottingham, Bristol, Southampton, Brighton

Precision in sheetmetal
FOR THE AIRCRAFT INDUSTRY

B·A·P

Burnley Aircraft Products specialise in the manufacture and repair of jet pipes, flame tubes, exhaust units and discharge nozzles, etc.

BURNLEY AIRCRAFT PRODUCTS LTD., FULLEDGE WORKS · BURNLEY · LANCASHIRE · ENGLAND
Phone: Burnley 3121 *a.d.h. 943*

"Flight" photograph

DRESS PARADE: Canberras from Binbrook—photographed "en masse" for the first time—practise Battle of Britain Week formations. Five are wearing the new grey and green camouflage, with the earlier-type "P.R. blue" below the waistline. The lower aircraft on the right has tip-tanks.

SERVICE AVIATION

Royal Air Force and Naval Aviation News

Exercise "Mainbrace"

THE largest N.A.T.O. operational exercise yet conducted, code-named "Mainbrace," began on Saturday last, September 13th, and is to continue until about the 25th. The N.A.T.O. forces taking part are under the two Supreme Allied Commanders, Admiral Lynde D. McCormick, U.S.N. (Supreme Allied Commander, Atlantic), and General Matthew B. Ridgway, U.S.A. (Supreme Allied Commander, Europe), who have designated Admiral Sir Patrick Brind, R.N. (C-in-C. Allied Forces, Northern Europe) to conduct the exercise. At his headquarters in Oslo, before operations began, Admiral Brind stated: "The purpose of the exercise is to put into practice international N.A.T.O. co-operation for defensive purposes."

"Mainbrace" is predominantly an exercise for maritime forces, both sea and air, in support of land and air forces in Northern Europe. Military forces of Canada, Denmark, France, Netherlands, Norway, Portugal, the United Kingdom and the United States are taking part, together with more than 160 ships, varying in size from minesweepers and patrol boats to the battleships H.M.S. *Vanguard* and U.S.S. *Wisconsin*. Eight large aircraft carriers are included in the Task Force: H.M.S.s *Eagle*, *Illustrious*, *Theseus*; H.M.C.S. *Magnificent*; U.S.S.s *Midway*, *F. D. Roosevelt*, *Wasp* and *Wright*; and several smaller escort carriers.

The importance of the carriers' role in the exercise is considerable. Their mobility, and the security against air and submarine attack provided by their aircraft for both the warships and trade forces, are fully realized. During the operation, therefore, the carriers are undertaking a great variety of tasks, one of the most important being to give direct support to the Allied ground forces in their battle. While supporting the Army, the carrier aircraft are under the control of Maj. Gen. Warren R. Carter, U.S.A.F., assisted by a number of specially trained ground control teams. These teams, consisting of air personnel working with the soldiers, establish contact with the oncoming naval aircraft and direct their attacks against ground targets, first in Norway and later in Jutland. The object of this phase of the exercise is two-fold: firstly, to provide training for the ground control teams in direct close tactical support missions and, secondly, to familiarize the naval pilots with supporting operations while under control of the Allied ground-control director teams. Also under the direction of these air/ground control teams are the operations of the transport aircraft, from which arms, ammunition and supplies, are being dropped by parachute to the Allied ground forces and of photographic reconnaissance aircraft.

"Mainbrace" is taking place concurrently with the B.A.O.R. exercise "Holdfast," and in its later stages will incorporate a ground exercise known as "Scandia III," in which British, Danish and Norwegian troops, under command of the Rhine Army, will oppose landings in Jutland.

The largest contribution yet made by the R.A.F. to such an exercise comes from Coastal, Bomber and Flying Training Commands, and in overall control of all shore-based maritime aircraft is the A.O.C. Coastal Command, Air Marshal Sir Alick Stevens, acting in his N.A.T.O. appointment as Air Commander-in-Chief, Eastern Atlantic. Under him is the A.O.C. No. 18 Group, Coastal Command, A.V-M. H. T. Lydford, commanding the shore-based maritime aircraft in his area, in his capacity as N.A.T.O. Air Commander, Northern Sub-Area.

Coastal Command, in addition to operating from bases in Britain, has sent a squadron of Sunderlands to operate with U.S. Navy flying boats from Trondheim, and two squadrons of Shackletons to operate from Stavangar. R.A.F. Sunderlands are operating also from Sullom Voe, in the Shetlands, where the important wartime flying-boat base has been re-opened. Among the United Kingdom bases being used by Coastal Command Shackletons during the exercise are Kinloss, Morayshire, and Topcliffe, Yorkshire.

The chief role of the Sunderlands and Shackletons of Coastal Command is to provide anti-submarine escort and reconnaissance against surface vessels for an Allied (Blue) carrier force and convoys sailing from Scottish ports to Northern Norway and subsequently towards Denmark. In this they are co-operating closely with ships and carrier aircraft. Convoys to and from Scandinavia are being given similar protection against a variety of attacks by Orange (enemy) sea and air forces.

Two coastal Command Lancaster squadrons are operating with the Orange forces, together with French and Netherlands naval squadrons. French Lancasters are flying from Ballykelly, Northern Ireland, and Netherlands PV-2 Harpoons from Leuchars, Fifeshire. R.A.F. Bomber Command and Flying Training Command are also working with the Orange forces. Lincolns and Washingtons based in Eastern England are simulating high-level raids by night against Blue shipping, while other Bomber Command aircraft are engaged in mining sorties. Flying Training Command Lincolns, Varsities and Wellingtons are being used to carry out medium-level attacks on Blue shipping.

First reported encounters occurred last Saturday, when the Orange submarine *Tacitum* claimed to have torpedoed H.M.S. *Eagle* and *Illustrious*, and U.S.S. *Midway* and *F. D. Roosevelt*. Attacks were made by aircraft from H.M.S. *Triumph* and by a Shackleton from Stavangar on Orange submarines north and northwest of the Shetlands, while the Oslo headquarters of Admiral Brind, and harbour installations at Bergen, were attacked by Orange Thunderjet aircraft. Bomber Command Mosquitos were searching for the Canadian cruiser *Quebec*, an Orange surface raider, over Norwegian waters.

SERVICE AVIATION . . .

R.A.F. Appointment

THE Air Ministry announces the appointment of A.V-M. N. H. D'Aeth, C.B., C.B.E., as Air Officer i/c Administration at H.Q. Technical Training Command.

A.V-M. D'Aeth has been A.O.C. Malta, since November, 1949, and was formerly Director of Navigation and Control at the Air Ministry from February, 1948. At the outbreak of the war he commanded an Anson Squadron in Coastal Command and subsequently held a succession of senior posts in that Command.

After the war he was Commandant of the Empire Air Navigation School for two and a half years, during which time he captained the Lancaster *Aries* on its record-breaking flights to India, Australia and New Zealand and on its non-stop record flight from Cairo to Cape Town in 1946.

A.V-M. D'Aeth began his Service career in the Royal Navy, and transferred to the R.A.F. in 1920. Much of his subsequent service was with the Fleet Air Arm and Coastal Command. In 1930-31 he was leader of the flying section of the British Arctic Air Route Survey Expedition to East Greenland, for which he received the Polar Medal.

Air Operations in Malaya

DURING the month of August the increased tempo of operational sorties in support of security forces was fully maintained when R.A.A.F. Lincolns and R.A.F. Hornets, Brigands, Vampires and Sunderlands flew over 400 sorties. Target areas were well dispersed throughout Federation, the majority of air strikes taking place in the Straits of Perak and Johore.

Supply-dropping operations by R.A.F. Valettas during the month were on the same considerable scale as last month, with a slightly larger total of one quarter of a million pounds being dropped to jungle patrols and police posts. Of this amount little less than half was dropped to units operating in the Kuantan area. Since the start of these operations a total of half a million pounds of supplies has been dropped on jungle clearings in these areas to ground forces. A feature of the month was the exceptionally large number of surrender leaflets dropped—over three million—mainly in Pahang and Perak States by Valettas and Auster aircraft.

Helicopters of the Far East Force Casualty Evacuation Flight lifted four casualties from jungle clearings during the month while A.O.P. Auster flights flew large numbers of visual reconnaissance sorties in addition to communication and casualty evacuation escort flights. Air-sea patrols and photographic reconnaissance sorties were also flown.

New R.N.V.R. Squadron

A NEW R.N.V.R. anti-submarine squadron equipped with Fireflies—the third such squadron to be manned by pilots and observers of the R.N.V.R.—has been formed at R.N. Air Station Stretton, near Warrington, Lancs. Lt.-Cdr. (A) Kenneth Harvey Tickle, R.N.V.R., who commands No. 1831 fighter squadron, also based at Stretton, is commanding officer of the new unit, which will be known as No. 1841 Squadron.

It will be the first occasion since the formation of the R.N.V.R. Air Branch in 1947 that two squadrons are to have their headquarters at the same Naval air station. Both are being administered by Cdr. R. I. Gilchrist, M.B.E., R.N.V.R., C.O. of the R.N.V.R. Air Division established at Stretton in June of this year.

The two other R.N.V.R. anti-submarine squadrons are Nos. 1830 and 1840, based at Donibristle (Fife) and Ford (Sussex) respectively.

Loss to a Mess

THE Commanding Officer of R.A.F. Station, Castle Bromwich, announces, "with deep regret," the death of Mr. Leonard Poole, who had been butler to the officers' mess for nearly 20 years, and had over 30 years' unbroken service in R.A.F. messes. "Castle Bromwich will not seem complete," writes the C.O., S/L. A. Lewis Walker, "without the presence of Poole, whose tact and diplomacy were a by-word throughout the Service."

Reunions

THERE will be a combined "Strike Squadron Reunion" for Squadrons 254, 236 and 143 on Saturday, November 1st, at the Chez Auguste Restaurant, 47 Frith Street, London, W.1. Ex-members are asked to communicate with Mr. G. H. Webb, 48 Hendham Road, London, S.W.17 (Balham 5337).

There will be a No. 612 Squadron reunion in London on November 8th. Particulars are obtainable from Mr. W. N. Parsons, 24 Whitehall Gardens, London, W.3.

WITH the R.C.A.F. SABRES at NORTH LUFFENHAM

ON Friday last *Flight* was given a preview of the "Battle of Britain Open House" at the Luffenham base of No. 1 Fighter Wing, R.C.A.F. As this included attendance at a Wing briefing and opportunities of talking with the pilots, it proved of professional, as well as social, interest.

In the absence of G/C. E. B. Hale, D.F.C., C.D., the Wing's O.C., and leader of its Canadair-built Sabres in last Monday's fly-past, the briefing officer was F/L. Bill Bliss, acting C.O. of No. 439 Squadron, sometime bush pilot and member of the R.C.A.F. Air Defence Command aerobatic team. He explained how the three participating squadrons—410, 441 and 439—would form up in boxes of four and how, with the pilots using the Sabres' swept leading-edges as sighting lines, these boxes would appear as perfect diamonds. When he impressed on the pilots that a timing error of 10-20 secs at the South-end "funnel" (whence the massed squadrons would feed into the London area) would cause an overlap with other formations, the delicacy of the whole operation became only too apparent.

The flights would get away at ten-second intervals and for the practice that afternoon F/L. Bliss, in the lead, would take off at "96 per cent," retract his wheels, then throttle back to 90 per cent. Out of consideration for the Sabres' undercarriages, pilots were to burn off excess fuel before landing. Taxying instructions for the return were—as the flight lieutenant put it—"what the boss told us yesterday; odds on the left of the runway, evens on the right." "That," he added, "is an S.O.P. from now on." And he gave a final caution: "Let's cut out burning our brakes off."

From flying control we saw the ranks of Sabres, resplendent in their squadron markings. Those of 439 (Tiger) Squadron have a yellow stripe, edged with red, on the fin, and red diamonds on a yellow band round the nose. Proclaiming 441 (Silver Fox) Squadron (S/L. A. R. MacKenzie, D.F.C.) is a black-and-white checkered nose and a similarly checkered band round the tail, and for No. 410 (Cougar) Squadron (S/L. D. Warren, D.F.C.) there are red and white chevrons on the tail and white diamonds on a red ring round the nose.

In obviously bumpy conditions the standard of formation flying was as near perfect as we could hope to see, and equally admirable was the individual aerobatic performance of F/O. Ronasson. Of all his manoeuvres the most spectacular was one in which, to the best of our knowledge, the Sabre has not yet been equalled—the multi-turn vertical roll. This, we were assured, is a matter of delightful simplicity. After 550 knots or so have been built up on the clock, the control column is eased back until the Sabre is climbing absolutely vertically. Then the stick is moved over, perhaps three or four inches and with a mere 10-lb pressure, and kept there; and round goes the Sabre, six, eight, ten—even twelve times, over a height band of 10,000-13,000ft.

Another most impressive performance—again demonstrated by F/O. Ronasson—is the fly-over at 115-120 kt, with the Sabre apparently disintegrating, so large are the projecting areas of leading-edge slats and fuselage air brakes. Landings are somewhat "hotter," due to the necessity for keeping the tail end of the fuselage off the runway.

Supersonic diving is now a matter of course; as one officer put it, it has been over-rated.

A note appears to be called for on the name "Star," which has been erroneously applied to the Canadair-built F-86Es now in use at North Luffenham. In point of fact, the full and correct rendering is F-86E*, the star signifying certain modifications to the original American-pattern F-86E. Thus, the control-column break-out force (that is, the force required to move the stick from neutral) has been reduced from 4lb to 1lb and certain changes have been made in the instrumentation. The very newest designation, as used in the Battle of Britain Day programme, is Sabre 2, though the adoption of this—apparently official—nomenclature was new to pilots with whom we spoke.

But by any other name, these Sabres would be just as remarkable, and it is good to know that another 60 of them will soon be flying the Atlantic. These will form No. 2 Fighter Wing and they will be based at Gros-Tenquin, 40 miles east of Metz. Eventually there will be four R.C.A.F. Fighter Wings, each of three squadrons, on the Continent. No. 1—our North Luffenham hosts—will be the last to move. The target date for this transfer is 1954, but will depend on airfield availability.

Meantime, the R.C.A.F. is keeping its hand in. G/C. Hale has recently returned from Korea, where he has been flying Sabres, and S/L. Bob Davidson left last week for a similar tour of duty.

One of a series of Assembly Jigs built by us for the assembly of various members and trailing edges on the wings of the Canberra Bomber

AGGRESSION

is not a bad form of defence.

An aggressive attitude to the problem of speeding up output and maintaining quality will hasten the day when we can sit back and contemplate the future with equanimity, without any more fear of war.

Let us tackle some of your production problems with the aggressive efficiency with which we tooled up for the previous victory.

Specialists in
JIGS & FIXTURES
PRESS TOOLS
GAUGES
STAMPINGS
CAPSTAN LATHE WORK
MACHINED COMPONENTS
SPECIAL MACHINE TOOLS
PLASTIC MOULDS
REPETITION WORK
Also
RATCHET SPANNERS
AND A COMPLETE RANGE OF "LEYTOOL" HIGH QUALITY HAND TOOLS

Fully A.I.D. approved Ref. No. 79.3672/38.

Leytonstone
JIG & TOOL Co. Ltd.
LEYTOOL WORKS, HIGH RD., LEYTON, LONDON, E.10
Phone: Leytonstone 5022-4

the material for..

JIGS • FORMERS • MOULDS
RUBBER PRESS TOOLS • ETC

Between metal and wood comes JICWOOD 'C', a material lighter than Aluminium Alloy yet stronger than any hardwood. Hardness and immense durability are others in a list of virtues that give a very wide range of industrial usefulness to this valuable result of Airscrew-Jicwood specialisation in wood technology.

JICWOOD 'C' was first developed when no other suitable material could be found able to withstand the high stresses affecting the roots of propeller blades fitted to military aircraft. In this role it has proved its fitness every time — an indication of its actual strength.

For fuller information write to

THE AIRSCREW COMPANY & JICWOOD LTD
WEYBRIDGE · SURREY
Telephone: Weybridge 1600 · Telegrams: Airscrew, Weybridge

Instruments for Repair?

Wynn

Overhaul and Release of all types of Aircraft Instruments

Luminous and Fluorescent Dial work

send them to

A.I.D. and A.R.B. Approved

Wynstruments LIMITED

STAVERTON AERODROME GLOUCESTER

Phone: Churchdown 3264 (3 lines)

THE OLD ESTABLISHED
AIRCRAFT FURNISHING SPECIALISTS

RUMBOLD

L. A. RUMBOLD & Co. LTD.
KILBURN, LONDON, N.W.6

All classes of
MACHINE ENGRAVING
from
SIMPLE DIALS
to
INTRICATE DIES

JOHN MEERLOO & SONS LTD.
74 LONDON RD., KINGSTON-ON-THAMES
ON A.I.D. APPROVED LIST NO. 4362/60

Suppliers of machined and fabricated components in Tufnol, Bakelite and similar materials to Britain's aircraft industry

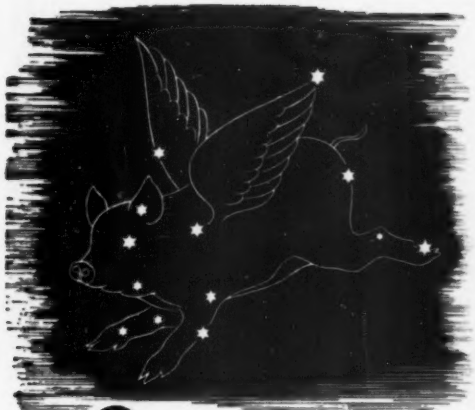
Telephone: CLERKENWELL 2333/4 & 7247

UHLHORN BROS. LIMITED ESTD. 1887

Telegrams: UHLHORN, AVE, LONDON

We are proud to have the pleasure of supplying our precision products to many of the leading British aircraft constructors

UHLHORN BROS. LTD.
53 CITY ROAD, LONDON, E.C.1



Pigs do fly

Scientific achievement is playing havoc with a lot of old proverbs nowadays, for prize porkers — as well as many other heavy things — are quite common freight in aircraft. And to make such cargoes bring in as much money as possible, the materials and equipment used in an airliner must afford the maximum efficiency for the minimum tare. That is why Oldham Aircraft Batteries are gaining increased popularity every day, for they are designed to give the greatest output for the least weight.

OLDHAM

POWER TO SPARE

AIRCRAFT BATTERIES

OLDHAM & SON LTD DENTON · MANCHESTER EST. 1865

AVIATION TRADERS LIMITED

Our A.R.B. approved bonded stores at Southend, Stansted and Blackbushe Airports, carry among the largest stocks of airframe, engine and ancillary spare parts in this country.

Listed below is a selection from our stock:—

Inquiries are invited for Terry Anglepoise Lamps A.M. Stores Ref. 5C 1079, in manufacturers condition and A.R.B. released.

We have a large quantity of Simms Contact Breaker Assemblies, part No. F.50863/1 in original packing and A.R.B. released.

We can now offer a list of our 'Cannon' and 'Amphenol' plugs and sockets, of which we have a stock of approximately 10,000 covering the AN ranges 3055, 3100, 3101, 3102, 3106 and 3108, and Letters AC-WKCL. Lists on application to our Sales Department.

We would like to announce, that, we are producing a list of 'Bosch' and 'Scintilla' Magneto Spares, held in our Main Stores.

We would be pleased to quote for 'Kent' Flowmeter Transmitters, part No. MA.4006/1. Ref. No. 6A/1547.

Inquiries for any of the above items or items not shown to our Sales Department:

15, Great Cumberland Place, London, W.1

Telephone:	*Telegrams:*	*Cables:*
AMBassador 2091 : 5 lines.	'Aviatrade, Wesdo' London.	'Aviatrade' London.

Proud to be

SERVING FAMOUS FIRMS . . . .

Heston Aircraft have long specialized in the complete design and manufacture of a variety of aeronautical equipment — from simple components to complete aircraft. Leading manufacturers who rely on the service of Heston Aircraft include :—

- The de Havilland Aircraft Co. Ltd.
- Vickers-Armstrongs Ltd.
- D. Napier & Son Ltd.
- B.O.A.C.

HESTON AIRCRAFT COMPANY, LIMITED

Heston Airport, Hounslow, Middlesex

THROUGH THE SONIC BARRIER WITH NEVILLE DUKE!

KING

Toggle Fasteners and all-metal flexible fireproof pipe couplings are fitted on 90% of modern prototype and production British Aircraft

KING AIRCRAFT CORPORATION
HILLINGTON · GLASGOW · S.W.2
Tel: Halfway 4871 Telegrams: Aircra't. Glasgow
Sole Concessionaires in U.S.A.
Simmonds Aero accessories Inc., Tarrytown, New York
Sole Concessionaires in Australia:
Eyelets Proprietary Ltd., 48 Green Street, Windsor, S.1, Melbourne

FREE A VALUABLE BOOK which details the wide range of Engineering and Commercial Courses of modern training offered by E.M.I. Institutes—the only Postal College which is part of a world-wide Industrial Organisation.

Courses include training for:

A.F.R.Ae.S. Examination, M.C.A. Aircraft Radio Maintenance Certificate; A.R.B. Aircraft Engineers' Licences; General Training courses in Aeronautical Engineering; P.M.G. Certificate, also courses in all branches of Engineering.

EMI Institutes associated with MARCONIPHONE COLUMBIA HMV

COURSES FROM £1 PER MONTH

POST NOW

Please send, without obligation the FREE book
E.M.I. Institutes, Dept. 120
43 Grove Park Rd., Chiswick, London, W.4
Name .....
Address .....
IC.IYK

STEEL BUILDINGS for DISPOSAL

Structure. 100′ × 48′ × 14′ high.
Asbestos roof and sides. 6′ glazing in roof slopes.

Storage Building. 180′ × 90′ in three 30′ bays × 14′ high.
New cladding and ¼″ P.G. in roof slopes.

Crane Building. 226′ × 55′ span × 27′ high.
With 5 ton O.E.T. crane 400/440V. Steel sliding doors, gutters, etc.

Single Story Building. 192′ × 42′ 6″ × 14′ high. Ready for erection.

These buildings can be supplied and erected complete

CHAMBERLAIN INDUSTRIES LTD.
STAFFA ROAD, LEYTON E.10
Telephone : LEYtonstone 3678

FLIGHT and AIRCRAFT ENGINEER

PRESS DAY — *Classified advertisement "copy" should reach Head Office by* FIRST POST THURSDAY *for publication in the following week's issue subject to space being available.*

CLASSIFIED ADVERTISEMENTS

Advertisement Rates. 4/- per line, minimum 8/-, average line contains 6-7 words. Special rates for Auctions, Contracts, Patents, Legal and Official Notices, Public Announcements, Tenders 5/- per line, minimum 10/-. Each paragraph is charged separately, name and address must be counted. All advertisements must be strictly prepaid and should be addressed to FLIGHT Classified Advertisement Dept., Dorset House, Stamford Street, London, S.E.1.

Postal Orders and cheques sent in payment for advertisements should be made payable to Iliffe & Sons, Ltd., and crossed & Co.

Trade Advertisers who use these columns regularly are allowed a discount of 5% for 13, 10% for 26 and 15% for 52 consecutive insertion orders. Full particulars will be sent on application.

Box Numbers. For the convenience of private advertisers Box Number facilities are available at an additional charge for 2 words plus 1/- extra to defray the cost of registration and postage, which must be added to the advertisement charge. Replies should be addressed to "Box 0000, c/o Flight," Dorset House, Stamford Street, London, S.E.1.

The Publishers retain the right to refuse or withdraw advertisements at their discretion and do not accept liability for delay in publication or for clerical or printer's errors although every care is taken to avoid mistakes.

Situations Vacant. The engagement of persons answering these advertisements must be made through the local office of the Ministry of Labour and National Service etc. if the applicant is a man aged 18-64 or a woman aged 18-50 inclusive, unless he or she or the employer is excepted from the provisions of The Notification of Vacancies Order 1952.

AIRCRAFT FOR SALE

W. S. SHACKLETON, Ltd., hope that the readers of these everlasting advertisements will excuse our becoming boring on the number of different types of aircraft sold. Last year, you will remember, it was 35, and now in the last quarter of this year the score so far is up to 28.

JUST to remind you of the types, many of which are still available in considerable numbers, we give the list below:—

DE HAVILLAND TYPES
1. TIGER MOTH
2. MOTH MINOR
3. HORNET MOTH
4. RAPIDE
5. DOVE
6. PUSS MOTH

MILES AIRCRAFT TYPES
7. AEROVAN
8. MESSENGER
9. MAGISTER
10. VENCURT
11. GEMINI

AUSTER AIRCRAFT TYPES
12. AUTOCRAT
13. AUSTER V
14. AGLET
15. AUTOCAR
16. TAYLORCRAFT PLUS D

MISCELLANEOUS TYPES
17. PIPER CUB
18. HEINEMANN TRAVELLER
19. CHRISLEA SKYJEEP
20. HILLSON PRAGA
21. LOCKHEED LODESTAR
22. AVRO ANSON
23. FAIRCHILD ARGUS
24. AIRSPEED CONSUL
25. B.A. SWALLOW
26. PERCIVAL PROCTOR I
27. PERCIVAL PROCTOR V
28. AERONCA
29. CMLTON (Carden-Ford)

W. S. SHACKLETON, Ltd., 175 Piccadilly, London, W.1. Tel: Regent 2468/9. Overseas Cables: Shacknut, London. [0070

FIELD AIRCRAFT SERVICES, LTD., offer COMPREHENSIVE AIRCRAFT SERVICE. Please send your inquiries to: FIELD AIRCRAFT SERVICES, LTD., CROYDON AIRPORT, SURREY. Phone: Croydon 7777. Cables: FIELDAIR, Croydon. [0288

AEROSERVICES (LONDON) LIMITED For EVERYTHING Aeronautical send your enquiries to:— 46, HERTFORD STREET, PARK LANE, LONDON, W.1 Tel.: GROsvenor 8383 Cables: AEROPAUL, London. [1940

MILES GEMINI: airframe and engine hours 500 since new; 12 months C. of A.; interior grey leather. Full equipment. Immediate delivery. Offers.—Lonsdale Flying Services, Ltd., Blackpool Airport. [0001

VENDAIR, Croydon Airport, offer Auster Autocrat from £950; Taylorcraft from £300; Anson Mk. I open to offer; Gemini, £1,300; Magister, £300; Messenger, £1,250; Proctor, £900; Tiger Moth, £325; etc.

VENDAIR, Croydon 5777. [0231

EXCHANGE, 21 ft. by 8 ft. motor boat. Morris 14 h.p. petrol/paraffin engine, a first-class boat in new condition. Exchange for 2-3 seater aeroplane or sell for £295. —Full particulars from Box 2626. [0074

AEROCONTACTS, Ltd., leading distributors of new and used aircraft. Large stocks held at Gatwick for immediate inspection and early delivery. Specialist stockists of D.H. Dragon Rapides. "Aerocontactalogue" free on request.—Gatwick Airport, Horley 1510. [0060

FLYING BOOTS

Made of superb quality **BLACK LEATHER** firm and hardwearing, yet very pliable.

In addition a complete **SOFT, WARM SHEEP-SKIN LINING** ensures a cosy comfort not otherwise obtainable. Supplies strictly limited. **£3.19.6**

Also Boots of similar design but in **BROWN SUEDE** with zip front and Rubber soles. **£4.14.6**

Terms to Flying Clubs. Trade Supplied. Send 3d. in stamps for illustrated catalogue.

D. LEWIS LTD. (Dept. F)
Leather Clothing Manufacturers for Home or Export
124 GT. PORTLAND ST., LONDON, W.1
Trade Inquiries Invited.
Tel.: Museum 6114. Grams: Aviator, Wesdo, London

DAKOTA SPARES
Undercarriages—all parts available.
Wheels complete
Exhaust Collector Rings complete.
Exhaust Tail Pipes, Brake Drums.
All for immediate delivery ex stock.

Staravia
BLACKBUSHE AIRPORT
CAMBERLEY, SURREY
Tel. : Camberley 1600

Bring Competitive Prices into the Disposal of Your AIRCRAFT or SPARES. SALE by AUCTION and/or PRIVATE TREATY will assure your obtaining the highest price.
Full particulars of our Services. Write, phone or Cable
KENNEDY, SON & PARTNERS
Auctioneers and Surveyors
GATWICK AIRPORT, HORLEY, SURREY
Telephone: Horley 1510, or 13.
Free entry on our disposal list open to all owners, without obligation or engagement.

AIRCRAFT FOR SALE

DARLINGTON & DISTRICT AERO CLUB have for sale: PROCTOR III, long-range tank, four seats. C. of A. valid till December, 1952.
AUSTER AUTOCRAT. 12 months C. of A., long-range tank and starter.
AUSTER AUTOCRAT, longe-rang tank and starter. C. of A. expired.
MAGISTER aircraft. C. of A. expired.
ALSO full range of Magister spares.
DARLINGTON & DISTRICT AERO CLUB, 41 Blackwellgate Darlington. Tel. 4307 [0079
R. K. D'UNDAS, Ltd., can present immediately to buyers in any part of the world an unequalled selection of:—
AUSTERS
MESSENGERS
GEMINI
RAPIDES
PROCTORS
TIGER MOTHS
QUOTATIONS for aircraft expertly packed and delivered anywhere in the world on request.
R. K. DUNDAS, Ltd., 39 Bury Street, London, S.W.1. WHI. 2949. Cables: "Dundassco, Piccy, London."

CROYDON AIRPORT: Cro. 7744. [0149

FOR SALE. Avro Tutor, Lynx 4C engine, engine hours 120 approx., airframe 1,467 approx. C. of A. to October 23, 1952. Attractively finished in pale blue. General condition very good. Suitable for banner towing or for vintage aircraft enthusiast.—Further details from Derby Aviation, Ltd., Derby Airport, Burnaston, nr. Derby, Tel.: Etwall 323. [0076

AIRCRAFT SERVICING

CRACK detection by Magna Flux. A.R.B. Certificate of Compliance coverage for aircraft parts. Prompt service. reasonable charges.
C. AND S. AIRCRAFT, Blackbushe Airport, Camberley (1600 (Extn. 307). [0010
BROOKLANDS AVIATION, Ltd., Brooklands Aerodrome, Weybridge. C. of A. overhauls, modifications and conversions. Tel.: Byfleet 426. [0005
REPAIRS and C. of A. overhaul for all types of aircraft. —Brooklands Aviation, Ltd., Civil Repair Service, Sywell Aerodrome, Northampton. Tel.: Moulton 3218. [0307
IMMEDIATE capacity for remsir of Certificate of Airworthiness renewal on aircraft up to and including Consul, Anson and Rapide. Of particular interest to Aerovan operators. We hold a range of spares, from a dismantled Aerovan, including engines, metal propellers, etc.—Enquiries to Derby Aviation, Ltd., Derby Airport, Burnaston, nr. Derby. Tel.: Etwall 323. [0078

AIRCRAFT FOR HIRE

ANY type of aerial work required for two Mark V Austers. Commercial licensed pilot and engineer. For winter months.—Box 2809. [0070

AIRCRAFT WANTED TO HIRE

PRIVATE pilot wants Auster on hire, hourly or daily rate.—Box 2393. [0061

AIRCRAFT ACCESSORIES AND ENGINES WANTED

ARO engines: Wanted in any condition, providing full history available, all types of Cirrus engines.—Full details Box 2360. [0029

CAPACITY AVAILABLE

CAPACITY available for Spot Welding of Light Alloy Details. A.I.D. and A.R.B. approved. Box No. 2697. [0081

CARAVANS

NEW "Statesman," £1,095. Other Berkeleys from £399/10/-. New Glider 4-berth de luxe, £399/10/-, and 2-berth, £212. Safari, £368. Towing. Hire purchase.—Mantles Garages, Ltd., Biggleswade. Tel. 2115. [0307

CARAVANS

A CARAVAN from U.K.'s most stupid distributor?

A FOOL who has advertised daily and nationally for 10 years that he gives U.K.'s only unconditional guarantee with free van lent for a leaky one and all repairs free for a year at least and who has U.K.'s largest selection (See two pages of advertisement in *The Caravan* each month.) A fool who has paid thousands of his own money to support the £3,000 per annum home-maker Caravan Residents' Association, a fool who gives free delivery over 80 miles, a fool who sells only reliable makes including all well known N.C.C. approved van makes (Berkeley, Eccles, Thomson, Rollalong, Raven, etc., often at reduced prices, and still gives free delivery!) A fool who could sit down on a little wayside pit and sell 2 vans a week instead of 40 with one fiftieth of the trouble and more profit! Unfortunately he likes his business which is his life. Good h.p. terms. He has 1 lb. of advice articles and brochures free to those who would like to write to Dept. F. Taplow, please. A. S. Jenkinson, Limited (Our Equal Selection—London Branch), 80 Oxford Street, London, W.1 (Corner of Rathbone Place). Tel.: Langham 4066-7. Two minutes from Tottenham Court Road Tube Station. Open till 8 p.m. seven days a week. Also at Bath Road, Taplow, Bucks. Tel.: Maidenhead 7434-5-6. Always open. Easy to reach—right on Main A.4. Outskirts Maidenhead, Taplow Station 4 mins. Now open: Hammersmith Branch (corner of Sussex Place and Hammersmith Bridge Road W.6). One minute Hammersmith Broadway. Open till 8 p.m. every day. [0008

CLOTHING

R.A.F. and R.N. officers' uniforms purchased; large selection of R.A.F. officers' kit for sale, new and reconditioned.—Fisher's Service Outfitters, 65-66, Islington 64., Woolwich. Tel.: Woolwich 1065. [0067

CLUBS

REDHILL FLYING CLUB.

LEARN to fly at Redhill Aerodrome, Surrey. South London's nearest flying centre, 23 miles from Hyde Park Corner. £5/10/- per hour dual from £2/10/- per hour instrument flying, instructors' and advanced courses. Attractive clubhouse with full catering facilities.—Tel.: Nutfield Ridge 2265. [0047

PENGUIN FLYING CLUB. London's most accessible aerodromes. Dual 65/- per hour. Also charter and joyrides. Trial lesson, 17/6.—Phone: Victoria 1366. [0073

HERTS and ESSEX AERO CLUB, Panshanger Aerodrome, Nasning, Essex. M.C.A. approved 30-hour course; solo flying from 30/- per hour; residential; trial lessons 35/-; train from Liverpool Street, or Green Line Coach 715. Tel.: Hoddesdon 2683, 2421, 3709. [0030

CONSULTANTS

R. W. SUTTON (CONSULTANTS), Ltd., 7, Lansdown Place, Cheltenham. Tel. 5811. [0750

CANADA-Gt. Britain Liaison service. Technical and Sales. Forwarding. Contact:—W. P. Dunphy, Consulting Air Engineer, Montreal Airport, Montreal, Canada. [0040A

INSURANCE

ALL types of aircraft insurance and personal accident and C.O.—Apply to J. W. T. Ainger & Messrs. R. J. Moffat and Co., Percy House, 736, High Rd., Tottenham, N.17. Tel.: Tottenham 3003-4-5. [0084

PACKING AND SHIPPING

R. AND J. PARKS, Ltd., 143-9, Fenchurch St., E.C. Tel.: Mansion House 3083. Official packers and shippers to the aircraft industry. [0012

PATENTS

SUCCESSFUL partnership with unrivalled connections in Gt. Britain and U.S.A. invites holders of patented devices suitable for aircraft or light engineering to communicate with Box 2629. [0000

PHOTOGRAPHY

NEW Fairchild cameras K24, K30, K19, K18, K8A-B.—E.W.S. Co., 60, Church Road, Mosley, Birmingham. [0049

RADIOS

AVAILABLE: BC975R, BC191, BC624, SCR522,C SR695A, B1158, TR1143A, TR1133H, T1131, TR1464.—E.W.S. Co., 60, Church Road, Mosley, Birmingham. [0045

TIME RECORDERS

STAFF Item checking and job-costing time recorders (all makes) for quick cash sale; exceptional condition.—Box 7241. [0004

TUITION

AVIGATION, LTD.

(THE SAFE GUIDANCE AND HANDLING OF AIRCRAFT IN THE AIR)

AN increase in the number of civil airline transport pilots is a pressing need of the present Organisation in British aviation. Many ex-Service pilots, who at the cessation of hostilities had to find employment in other fields, are finding that the door to this type of career is opening once again. The young man just leaving the Service is also finding that a career in civil aviation has great prospects. The remuneration in these posts and, in some instances, the pensions offered, is also drawing the air-minded to consider a future in this field.

THIS establishment was formed to cater for these enthusiasts and give them a square deal in their quest for the basic knowledge, or refreshment of those forgotten problems. Postal courses are provided for those who will have to continue in other posts and work in the evenings to obtain their minimum qualification. Direct tuition is offered for those who are in the happy position to be able to devote full time, and a mixture of these is offered to those who wish to study at home and obtain a final "brush up" prior to sitting an examination.

THE bogey that it was almost impossible to pass an M.C.A. examination at the first sitting has been completely broken, 97% of our students have passed the examination completely in one sitting.

WE are certain we have a system of instruction, which is almost personal coaching, either direct or by post, and presentation, which is unsurpassed by any other establishment in this country.

OUR fee is the lowest in the long run, as there are no text books to be bought by the student. Send for our brochure without obligation, and our introduction and presentation samples of lessons to:—

26/31, CENTRAL CHAMBERS, EALING, W.5 (EAL. 8949). [0246

COMMERCIAL Pilots' licences, technical "General" and "Type-Rating" conversions, personal instruction. Five day full-time course for specific type. Special arrangements for urgent requirements. Particulars from Pilot, College of Aeronautical Engineering, 103, Sydney Street, Chelsea, Flaxman 0021. Nearest stations, South Kensington and Sloane Square. [0019

Give for those who Gave

Thousands of our finest men and women in the Royal Air Forces have given their service, their health, and in many cases, their lives for their Country and in defence of Freedom. Today many of them, and their dependants, are in urgent need of the R.A.F. Association's Welfare Service. Please give all you can for your emblem on Wings Day *or send a donation direct to Headquarters.*

WEAR THIS EMBLEM ON SATURDAY

R.A.F. WINGS DAY

WINGS DAY

SATURDAY SEPTEMBER 20th

ROYAL AIR FORCES ASSOCIATION

83 Portland Place, W.1.

Registered under the War Charities Act, 1940

PROCEEDS TO BE DEVOTED TO CHARITABLE AND WELFARE PURPOSES

Space Donated by: Messrs. Aerocontacts, Ltd., Gatwick Airport, Surrey

TUITION

A CAREER IN CIVIL AVIATION

Complete training facilities to M.C.A. application of I.C.A.O. standards, for all professional pilot/navigator qualifications on the FULL-TIME (personal coaching basis) or "STUDY-AS-YOU-WORK" (lessons, questions, model answers) method. Ideal those in Services or seeking higher licences:

COMMERCIAL INSTRUMENT RATING,
RADIO TELEPHONY, SENIOR COMMERCIAL,
A.L.T.P. (ALAC) CONVERSION), FLIGHT NAVIGATOR,
A.R.B. TYPE RATINGS (GENERAL AND SPECIFIC),
All simulated procedures with briefing for instrument flight test.

Flying instruction at best rates.
Assistance in securing employment.
Write for advice, without obligation:

LONDON SCHOOL OF AIR NAVIGATION (1949), Ltd., 8/10, King Street, London, W.6. (RIV. 7400.) [0277

LEARN to fly for £34: instructors' licences and instrument flying for £1 an hour; night flying £3/10/- an hour; residential fun, weekly. Approved M.C.A. private pilot's licence course.—Wiltshire School of Flying Ltd., Thruxton Aerodrome, Andover, Hants. [0253

AIRCRAFT engineer "A" and "C" licences; 2-year approved course. Diploma course combines full day workshop and technical training for executive appointments. Syllabus from Registrar in Charge, College of Aeronautical Engineering, Sydney Street, Chelsea. Flaxman 0021. [0050

A.F.R.Ae.S., A.R.B.Certs., A.M.I.Mech.E., etc., on "no pass no fee" terms; over 95% successes. For details of exams and courses in all branches of aeronautical work, navigation, mechanical eng., etc., write for 144-page handbook free. B.I.E.T. (Dept. 702), 17, Stratford Place, London, W.1. [0707

FREE! Brochure giving details of courses in all branches Aero eng., covering A.F.R.Ae.S., A.R.B.Certs., M.C.A. exams, etc. We are the only postal training college operated by an industrial organization. Write to E.M.I. Institutes, Postal Division, Dept. F26, 43, Grove Park Road, London, W.4. (Associated with H.M.V.) [0026

SOUTHEND-ON-SEA MUNICIPAL FLYING SCHOOL, Essex. Tel.: Rochford 54204. Comprehensive training for private, commercial licences and instructor's endorsements. M.C.A. approved for 30-hour course. Tiger Moth and Auster aircraft fitted with radio. Special facilities for training in instrument ratings. Hourly rates: dual £3/10/- night, £4. Dual £5/- extra. Contract rate £2/10/-. Link trainer 10/-. No fees or subscriptions. Trial lesson, 30/-. [0032

PUBLIC ANNOUNCEMENT

AIR TRANSPORT ADVISORY COUNCIL.

THE Air Transport Advisory Council give notice that they have received the undermentioned applications to operate scheduled air services:—

APPLICATION No. 9. From Don Everall (Aviation), Ltd., of Elmdon Airport, Birmingham, for a normal scheduled service with DH.89 aircraft for the carriage of passengers between Birmingham (Elmdon) and Jersey/Guernsey at a frequency of one to two services on Saturdays with additional services if required, during the period from October 4th, 1952, to May 30th, 1953.

APPLICATION No. 11 from Air Kruise, Ltd., of Lympne Airport, Kent, for a seasonal scheduled service initially with DH. 89A aircraft for the carriage of passengers and supplementary freight between Lympne and Le Touquet at a frequency of one to six services daily during the period from April 1st, 1953 to March 31st, 1963.

FROM Morton Air Services Ltd., Croydon Airport, Surrey.

APPLICATION No. 12 for a seasonal internal service initially with DH. Dove, Airspeed Consul and DH 89 aircraft for the carriage of passengers, supplementary freight and mail between London (Croydon) and Jersey/Guernsey at a frequency of two services Fridays and six Saturdays during the period from May 1st, 1953 to April 30th, 1959.

APPLICATION No. 13 for a normal scheduled service initially with DH. Dove aircraft for the carriage of passengers, supplementary freight and mail between Bristol (Whitchurch) and Paris (Le Bourget) at a frequency of three services weekly to two services daily during the period from March 1st, 1953 to December 31st, 1959.

FROM Birkett Air Service, Ltd., of 277 Acton Lane, W.4.

APPLICATION No. 14 for a U.K. internal service with DH.89A aircraft for the carriage of passengers, supplementary freight and mail between London (Croydon) and Alderney (Channel Islands) with intermediate stops at Southampton (off season only) at an initial frequency of two services weekly to one daily during the period from April 1st, 1953 to March 31st, 1960.

APPLICATION No. 15 for a U.K. internal service with DH.89A aircraft for the carriage of passengers, supplementary freight and mail between London (Croydon) and Southampton at an initial frequency of 3 services weekly to one service daily during the period from April 1st, 1953 to March 31st, 1960.

APPLICATION No. 16 for a U.K. internal service with DH.89A aircraft for the carriage of passengers, supplementary freight and mail between Southampton and Alderney (Channel Islands) at an initial frequency of 3 to 12 services weekly during the period from April 1st, 1953 to March 31st, 1960.

THESE applications will be considered by the Council under the Terms of Reference issued to them by the Minister of Civil Aviation on July 30th, 1952. Any representations or objections with regard to these applications must be made in writing stating the reasons and must reach the Council within 14 days of the date of this advertisement, addressed to the Secretary, Air Transport Advisory Council, 9, Buckingham Gate, London, S.W.1 from whom further details of the applications may be obtained. [0079

SITUATIONS VACANT

DRAUGHTSMEN
SENIOR AND INTERMEDIATE
required by
SHORT BROS. AND HARLAND, LTD.,
in their Aircraft Drawing Office,
BELFAST
(preferably with Aircraft Experience).
Applications, stating age, experience and salary required, to:—
CHIEF DRAUGHTSMAN,
SHORT BROS. AND HARLAND, LTD.,
QUEEN'S ISLAND, BELFAST. [0039

LANCASHIRE AIRCRAFT CORPORATION, Ltd. (Skyways of London) have vacancies at Standsted Airport for all categories of ground staff and at Bovingdon Airport for radio mechanics, instrument mechanics, aircraft electricians and inspectors.—Applicants may apply in person to the airport or in writing to the Personnel Manager at 11, Berkeley Street, London, W.1. [0051

SITUATIONS VACANT

BRITISH OVERSEAS AIRWAYS CORPORATION have vacancies at the Central Training Unit, Meadowbank, near London Airport, for the following:—

NAVIGATION INSTRUCTOR.

Essential qualifications:—

(a) Current Flight Navigator's Licence.
(b) Minimum of 1,000 hours' navigation flying experience.
(c) Practical experience in navigation instruction on the ground and in the air.
(d) Ability for clear self-expression.

Salary for this post £800 to £1,140 per annum.

ENGINEERING INSTRUCTORS.

Candidates are required to possess:

(a) Technical knowledge to standard necessary for "M" Licence in Cat. "A," "C" or "X" (electrics) or "X" (instruments, incl. electrical instruments).
(b) Five years' experience in maintenance and overhaul of one of the following:—
Airframes, engines, electrical equipment, instruments (incl. electrical instruments), auto-pilots.
OR an apprenticeship in aero engineering, with two years' maintenance experience as above. Ability for clear self-expression.

Salary, £546 to £780 per annum.

APPLICATIONS should be addressed to Staff Supt. (Recruitment), B.O.A.C., London Airport, Feltham, Middx. [8672]

TECHNICIANS FOR GUIDED WEAPONS

F. G. MILES, Ltd., at Redhill require technicians for development of guided weapons and other projects involving the development and application of structural plastics. Applicants should be of degree standard, but qualifications equivalent to Higher National would be considered. Some industrial experience is desirable, but applicants must have a practical outlook. The positions hold the advantage of "getting in on the ground floor" of this new and interesting development, with excellent prospects of advancement. Vacancies exist for development engineers, draughtsmen, senior stressmen and chemist, but in all cases the position will necessitate the closest liaison between the technician and shops.

F. G. MILES, LTD.,
REDHILL AERODROME, SURREY. [8613

UNIVERSITY OF SOUTHAMPTON. Department of Aeronautical Engineering.

DRAUGHTSMAN (laboratory assistant) required. The duties of the post will be to prepare laboratory experiments and to assist in the design of new wind-tunnel equipment.—Applications (three copies), together with the names of three persons to whom reference may be made, should be sent to the Secretary and Registrar, The University, Southampton. [8661

FOLLAND AIRCRAFT, Ltd., require a senior weights engineer for an interesting programme of aircraft work. Apply to the Personnel Manager, Folland Aircraft, Ltd., Hamble, Hants. [8630

LICENSED radio engineer and radio mechanics at our base at Stansted Airport, Essex. Apply by letter or telephone to the Senior Radio Engineer, Aviation Traders' Ltd., Southend Airport Essex. Tel.: Rochford 86491. (99½)

TWO experienced weights engineers required with minimum qualifications of Ordinary National Certificate. Apply Employment Manager, Vickers-Armstrongs, Ltd. (Aircraft Section), Weybridge Works, Weybridge, Surrey. [8645

ENGINEER required for service in Amman, Jordan. Requirements: A. and C. licence with Rapide and Consul endorsements. Pay £126 per month.—Apply P. and M. Aero Services, Ltd., 703 Watford Road, St. Albans (Tel.: 5107). [8635

ASSISTANT aircraft engineer required for water operations in Australasian zone with Canso aircraft. Four to six months' appointment, or would take on permanent U.K. staff on termination of contract if preferred.—Box 2610. [8671

JIG and tool draughtsmen, fully experienced, required by Percival Aircraft, Ltd., Luton Airport, Beds. Good working conditions and full welfare facilities, including staff pension scheme.—Applications to the Personnel Manager, stating age, experience, salary required. [8669

WRIGHT estimators, senior and intermediate, required by Percival Aircraft, Ltd., Luton Airport, Beds, for work on fixed wing and helicopter aircraft. Good welfare facilities, including staff pension scheme.—Apply, giving details of age, qualifications, experience and salary required, to Personnel Manager. [8592

AIRCRAFT company in Midland area require foreman for section engaged on details and sub-assemblies. Preferably machine-shop trained, with experience of fitting, sheet metal, tooling and production. Good disciplinarian, with full knowledge A.I.D. procedure.—Box 2608. [8667

H. M. BOBSON, Ltd., invite applications for positions in the drawing office as follows: designers, detail and modification draughtsmen, checkers, stressmen. The work is concerned with interesting projects connected with fuel metering equipment and hydraulic flying controls for aircraft.—Bobson Works, Fordhouses, Wolverhampton. [8626

TEST laboratory assistants (male) required by Percival Aircraft, Ltd., Luton Airport, Beds. National Certificate standard and previous experience on design of test laboratory equipment desirable. Good welfare facilities, including staff pension scheme.—Applications, stating qualifications, experience, age and salary required, to Personnel Manager. [8596

A Large Canadian Aircraft Manufacturing Company near Toronto

requires:

PLANNING ENGINEERS

for:

Machine Shop planning of aircraft parts; or Detail and Assembly planning of metal aircraft components; or Equipment planning or major components and final Assemblers

and:

JIG & TOOL DESIGNERS

for:

The design of machine shop jigs and fixtures; or Design of sub-assembly and main assembly jigs for metal aircraft components; or Design of press tools (mechanical and hydraulic) for quantity production of sheet metal aircraft details.

Applicants must be fully experienced on the type of work for which they apply and this must have been on a quantity production basis. Preference will be given to those who have served a full apprenticeship.

This Company offers qualified men a good starting salary with regular review and increases on merit, paid overtime, a seven and three-quarter-hour day, five-day week, group insurance and medical hospital plan, steady employment, good public transportation.

Transportation to Canada will be paid for selected applicants.

For further particulars apply or write to:

MRS. E. J. MIDDLETON,
A. V. ROE REPRESENTATIVE,
c/o ONTARIO IMMIGRATION DEPT., 12, NEW BURLINGTON STREET, LONDON, W.1.

GLOSTER AIRCRAFT CO., LTD.

HUCCLECOTE · GLOUCESTER

The following **VACANCIES** exist on progressive projects of advanced interest:—

STRESSMEN
Senior and Intermediate

WEIGHTSMEN
Senior and Junior

DRAUGHTSMEN
Structural and Electrical

Previous aircraft experience an advantage but not essential

Prospects are excellent for energetic and sound applicants

APPLICATIONS to be addressed to the **CHIEF DESIGNER** giving particulars of **Experience, Age and Salary**

FIRST CLASS designer draughtsman required. Sound knowledge of aircraft construction essential. Location in south-east England. Living accommodation. State age, experience and salary required.—Box 2627. [8677

REQUIRED immediately by Percival Aircraft, Ltd., Luton Airport, Beds, several draughtsmen with comprehensive experience of engine installations and allied systems. Good welfare facilities, including staff pension scheme.—Applications, in writing, stating age, qualifications, experience and salary required, to the Personnel Manager. [8601

APPLICATIONS are invited from senior and intermediate design draughtsmen. Experience of aero-engine design desirable, but not essential. Also checkers. —Please write stating age and giving details of previous experience in chronological order, to the Personnel Officer, The de Havilland Engine Co., Ltd., Stag Lane, Edgware, Middlesex. [8630

HANDLEY PAGE (READING), Ltd., The Aerodrome, Woodley, Reading, have vacancies in their design office for senior and intermediate airframe draughtsmen, a senior electrical draughtsman and senior and intermediate aerodynamicists of degree standard or with H.N.C. in aero subjects.—Please send full particulars to the Personnel Officer. [8674

CHRISTCHURCH, Hants. Applications are invited from experienced technical authors, technical illustrators and spares compilers required for the preparation of Ministry of Supply and Civil Manuals, repair schemes, etc.—Applications to Personnel Manager, The de Havilland Aircraft Co., Ltd., Airspeed Division, Christchurch, Hants. [8623

AIR FORCE, Naval, civil and helicopter aircraft all under design and development at Percival Aircraft, Ltd., Luton Airport, Beds. Applications are invited from senior and junior draughtsmen and stressmen, for work on this interesting programme. Good welfare facilities, including staff pension scheme.—Write, giving details of experience and salary required, to Personnel Manager. [8598

APPLICATIONS are invited from design draughtsmen and stressmen, also technical assistants with combined design and performance experience for work on both reciprocating and gas turbine aero engines.—Applications should state full particulars of experience and qualifications and should be addressed to the Personnel Officer, The de Havilland Engine Co., Ltd., Stag Lane, Edgware, Middlesex. [8600

THE Supermarine Works of Vickers-Armstrongs, Ltd., require immediately a technical assistant (male or female) for computing work in the Flutter Section of their Design Department. Higher School Certificate or Inter B.Sc. standard with aptitude for mathematics is required, but previous experience is not essential.—Apply, giving particulars of age, education and experience, to Personnel Department, Vickers-Armstrongs, Ltd., Hanley Park, Nr. Winchester. [8585

APPLICATIONS are invited for a staff appointment of a works superintendent in the aircraft overhaul and conversion works of Field Aircraft Services, Ltd., at their Nottingham unit. The appointment carries responsibility for the floor supervision of the complete works, including the ancillary repair and machine shop and control of some 250 personnel, and carries qualification for superannuation scheme. Applicants with wide experience of modern factory procedure and organisation, and with personal initiative and drive, should reply fully, with details of experience, age, salary required, enclosing copy references, to Personnel Officer, Field Aircraft Services, Ltd., Croydon Airport, Surrey. [8683

DOWTY EQUIPMENT LIMITED

require first class sound

PRACTICAL ENGINEERS
preferably with some experience of design, development and testing of jet engine accessories, particularly flow, acceleration and speed governing controls, burners and pumps. Exceptional prospects of advancement.

SENIOR DRAUGHTSMEN
required for development work on fuel systems. Experience on light hydraulic or pneumatic controls acceptable.

SENIOR DRAUGHTSMEN
for hydraulic and undercarriage department also required, and

JIG & TOOL DRAUGHTSMAN

Important positions with prospects.

The Company's conditions are exceptionally good; there is a realistic pension scheme and the environment is ideal.

The Company employs a Housing Officer who will render every assistance.

Write, preferably in tabulated form, to PERSONNEL MANAGER,
DOWTY EQUIPMENT LTD.
CHELTENHAM

SITUATIONS VACANT

SENIOR scientific officers, Scientific officers, Patent examiner and patent officer classes. The Civil Service Commissioners invite applications for permanent and pensionable appointments to be filled by competitive interview during 1953. Interviews will continue throughout the year, but a closing date for the receipt of applications earlier than December, 1952, may eventually be announced. The scientific posts are in various government departments and cover a wide range of scientific research and development in most of the major fields of fundamental and applied science. The patent posts are in the Patent Office (Board of Trade), Admiralty and Ministry of Supply.

CANDIDATES must have obtained a university degree with first or second-class honours in an appropriate scientific subject (including engineering) or in mathematics, or an equivalent qualification; or for scientific posts possess high professional attainments. Candidates for senior scientific officer posts must, in addition, have had at least three years' post-graduate or other approved experience. Candidates for scientific officer and patent posts taking their degrees in 1952 may be admitted to compete before the result of their degree examination is known.

AGE limits: senior scientific officers, between 26 and 31; for scientific officers and patent classes, between 21 and 24 on 1st January 1953 up to 31 for permanent members of the experimental officer class competing as scientific officers). London salary scales: senior scientific officers, men, £913-£1,033; women, £881-£917. Scientific officers, men, £440-£707; women, £440-£676. Patent examiner and patent officer classes, men, £440-£655. (Rates for women under review.) Somewhat lower rates in the provinces.

FURTHER particulars from the Civil Service Commission, Scientific Branch, Trinidad House, Old Burlington Street, London, W.1, quoting No. 8,552/52 for senior scientific officers, and No. 8,553/52, S.1,282/52 for the other posts. [8066

The
British Air Line Pilots' Association
9-10 MARBLE ARCH, W.1
Tel.: AMB rsid'or 1357

Membership open to all Commercial and Service Pilots. For full details as to the objects and particulars of Membership please write to Secretary.

WOLVERHAMPTON AVIATION LTD.
THE LEADING LIGHT AIRCRAFT ENGINEERS.
THE AIRPORT WOLVERHAMPTON
tel. FORDHOUSES 2228

VACANCIES—PILOTS

AER LINGUS

will have a limited number of vacancies for **FIRST AND SECOND OFFICERS.** Applications are invited from Pilots under 35 years of age holding, as minimum qualifications:—Commercial Pilot's Licence, Instrument Rating and R/T Licence.

The salary scales for Pilots are:—

Second Officer
£800 x £25 to £900 per annum

First Officer
£950 x £30 to £1,250 per annum

Captain
£1,250 x £50 to £1,450 per annum

Senior Captain Second Class
£1,450 x £50 to £1,800 per annum

Senior Captain First Class
£1,750 x £50 to £1,950 per annum

Applications should be made on the Company's standard Application Form, which may be had on postcard request from the

STAFF & SERVICES MANAGER
AER LINGUS
DUBLIN AIRPORT
COLLINSTOWN, CO. DUBLIN

The latest date for receiving completed Application Forms will be October 10th.

SITUATIONS VACANT

TECHNICAL Illustrator required, aged 23 or over, with considerable practical experience.—Applications, in writing, to Personnel Manager, Percival Aircraft, Ltd., Luton Airport, Beds, stating age, experience and salary required. [8065

TECHNICAL assistants required for interesting laboratory and field work connected with guided weapons project. Applicants should be between 20 and 28 years of age and have at least an Ordinary National Certificate (mechanical or electrical) or its equivalent. Experience of work on servo systems or hydraulic equipment would be of value. Applications, giving details of qualifications and experience, should be sent to the Personnel Manager, Bristol Aeroplane Co., Ltd., Aircraft Division, Filton House, Bristol. [8028

SITUATIONS WANTED

PILOT (22), commercial and R.T.; 470 hours military types (250 twins); seeks flying work.—Box 2807. [8068

SENIOR commercial, R/T and inst. rating, 3,000 hours, seeks position with accommodation.—Box 2876. [8029

TECHNICAL representation—engineer (38) with 18 years' varied engineering experience up to management level wishes to contact a company of repute with a view to technical representation or similar. Advertiser is keen, adaptable and of good education.—Box 2458. [8039

BOOKS, ETC.

"FLIGHT," 1942, 1943 complete; 1941 copy missing. Offers.—Box 2594. [8064

COTTON BAGS
FOR SPARE PARTS, etc.
WALTER H. FELTHAM & SON, LTD.
Imperial Works, Tower Bridge Road,
Telephone: HOP. 1784 LONDON, S.E.1

AIRCRAFT SPRING WASHERS

TO B.S. SPECIFICATION S.P.47

CROSS MFG. (1978) LTD. COMBE DOWN, BATH

ONCE dermatitis gets to work — hands are soon out of work. Hands which are in constant contact with industrial irritants — solvents, and cutting or cellulose oils — need a constant safeguard. By acting as a barrier against dermatitis, Rozalex keeps all hands active on the job.

There is a type for every trade.

Send for free sample and leaflet "The Skin in Industry" to ROZALEX LTD., 10 NORFOLK STREET, MANCHESTER, 2

ROZALEX
DERMATITIS BARRIER PREPARATIONS

GROUND RADIO ENGINEERS

WITH LICENCES IN "A" or "B" OR BOTH CATEGORIES

IMMEDIATELY REQUIRED

Write to:-

AVIATION TRADERS LTD.
ENGINEERING MANAGER
STANSTED AIRPORT, nr. BISHOPS STORTFORD, ESSEX
TELEPHONE:— BISHOPS STORTFORD 1200

SLINGSBY SAILPLANES LTD.
CONTRACTORS TO H.M. GOVERNMENT
DESIGNERS AND MANUFACTURERS
OF
THE FAMOUS **"SKY"** SAILPLANE
The leading competition machine with performance and handling characteristics superior to any other sailplane in production.
AN ALL-BRITISH PRODUCT
SLINGSBY KIRBYMOORSIDE YORK
"PIONEERS OF BRITISH GLIDING"

Printed in Great Britain for the Publishers, ILIFFE & SONS LTD., Dorset House, Stamford Street, London, S.E.1, by SUN PRINTERS LTD., London, and Watford, Herts. Flight can be obtained abroad from the following: AUSTRALIA AND NEW ZEALAND: Gordon & Gotch, Ltd. INDIA: A. H. Wheeler & Co. CANADA: The Wm. Dawson Subscription Service, Ltd.: Gordon & Gotch, Ltd. SOUTH AFRICA: Central News Agency, Ltd.; Wm. Dawson & Sons (S.A.), Ltd. UNITED STATES: The International News Co. Entered as Second Class Matter at the New York, U.S.A., Post Office

TIMKEN

TAPERED-ROLLER BEARINGS IN HELICOPTERS

Illustration by courtesy of Westland Aircraft Limited.

BRITISH TIMKEN LIMITED
DUSTON, NORTHAMPTON; & BIRMINGHAM

REGISTERED TRADE MARK:
TIMKEN

The Type 171 Mk.4 Sycamore is the most versatile military helicopter of its size in production. It can rescue up to three people in one sortie and is fitted with a powered winch for this purpose. For ambulance duties two stretcher cases can be carried athwartships behind the pilot and medical attendant. For communications, reconnaissance and search operations four people in addition to the pilot can be carried. Tools for the conversion from one role to another are carried in the aircraft and the changeover is effected within minutes.

THE Bristol AEROPLANE COMPANY LIMITED · ENGLAND

12BAH